SCIENCE AND INDUSTRY Sci div 13

Contractors and Engineers Monthly

Vol. 38, No. 8 AUGUST, 1941 $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **New Flood-Control Dam**
  Features of the contract for the $5,000,000 Mahoning flood-control dam in Pennsylvania were the interesting plant for high or low-level delivery of concrete and the safety cantilever forms. See page 2.
- **Precast Curbs for Air Field**
  The term "defense construction" covers a multitude of activities of many kinds and varieties. Included in the work at Westover Field, the Army Air Base at Chicopee Falls, Mass., was the production under subcontract of approximately 6 miles of precast concrete curb. See page 2.
- **Bridge Pier Reinforcing**
  The construction of the concrete piers for the Pit River Bridge, part of the highway and railroad relocation near Shasta Dam in California, involved some unusual features. The reinforcing for these piers is the heaviest ever used, and the welding of this reinforcing has been tough and exacting work. See page 2.
- **Publicity for Contractors**
  The time has come for contractors to stop hiding their lights under a bushel and come out and tell the public what they have been and are doing, and why "built by contract" means built more quickly, more efficiently and more economically. Every contractor will find food for thought and helpful suggestions in our symposium on contractors' public relations. See page 7.
- **New National Airport**
  The first of two articles, describing the design and layout of the new Washington National Airport at Washington, D. C., and some of the construction features, appears in this issue. See page 9.
- **Pan American Highway**
  An outline of the South American section of the Pan American Highway and a report on the progress being made on this 8,097-mile route linking the countries of South America is contained in the last of our series of articles on the Pan American Highway. See page 17.

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C. & E. M. Photo
Discharge of the two pumps handling drainage at a Texas underpass.

Texas Underpass Drainage Problem

Automatic Engine-Driven Pump Solves "Power-Off" Troubles During Storms; Has Telltale Records

✦ A flooded underpass is a menace to life; 8 feet of water stops traffic and may stop heartbeats. With thoughts like that in his mind, and a highway underpass on U. S. 90, 3 miles west of Houston, Texas, carrying 6,000 vehicles in 24 hours, under his jurisdiction, W. J. Van London, Texas Highway Department District Engineer for the Houston area,

(*Concluded on page 44*)

Hot-Mix Top Laid On Virginia Highway In the Mountains

(*Photo on page 48*)

Sam Finley, Inc., Roanoke, Va., Completed 9.4-Mile Project For Maintenance Division On U. S. 52-21 in Virginia

✦ ON grades between 7 and 9 per cent in the mountains of Virginia on U. S. 52 and 21 leading from Wytheville, Va., toward the West Virginia line, Sam Finley, Inc., of Atlanta, Ga., and Roanoke, Va., completed a resurfacing contract last summer for the Maintenance Division of the Virginia Department of Highways. For 9.4 miles from the Wythe County line to Bland Court House, the old surface-treated macadam highway winds through the mountains. The contract required the placing of a 140-pound treatment 18 feet wide for 7.4 miles and 20 feet wide on 2.0 miles on the steeper grades in the mountains. The binder accounted for 80 pounds and the top for 60 pounds, making a completed 1¼-inch retread.

The Mixing Plant

The contractor set up his 5,000-pound batch hot-mix plant at Bastian, Va., about ½-mile off the main road and requiring an average of 9 miles one way from the plant to the road. Both aggregate and asphalt were delivered by rail. The former was rehandled by an old Mead-Morrison crane with a ½-yard Williams clamshell bucket loading the material behind a bulkhead from which it flowed by gravity through a gate-controlled opening to a Link-Belt bucket elevator which raised the cold material to the drier. The 4-foot diameter x 25-foot long drier was equipped with one large fuel oil burner at the discharge end where the material went to the hot elevator which raised it to a rotary screen to size it into ⅜, ¼ and 10-mesh material. This was stored in separate bins at ground level immediately below the screen.

The particularly novel feature of this plant was the fact that the storage bins were at ground level while the weigh bucket was at the top of the plant. This saved considerable height in the plant but required an unusually skilled operator, as the controls for the flow of the hot material from the various bins were located on the weigh platform at the top of the plant, releasing the materials to the bucket elevator. The flow of any one material had to be cut off at such a time that the material still being carried up by the bucket elevator would just complete the correct weight for that material in the batch.

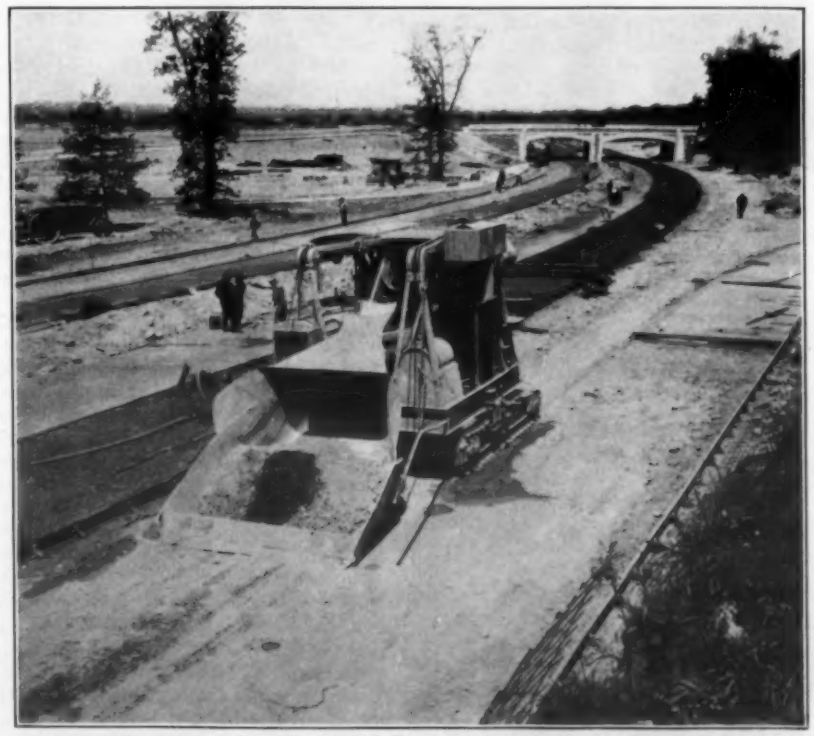
Adjacent to the plant was a 6,000-gallon storage tank for asphalt and another for fuel oil which was used both for the torch heating the drier and as a flux. The asphalt was handled from the tank cars to storage or direct to a 350-gallon heating kettle by a Gardner steam-jacketed pump and then from the heating kettle it was boosted by air pressure to the weigh bucket. A 50-hp horizontal boiler provided the steam for the pumps and for jacketing the asphalt lines as well as for heating the asphalt in the storage tank. A Prescott reciprocating pump was used for delivering the fuel oil under pressure to the drier torch or as a flux to the weigh bucket.

The special Finley pugmill, built by R. D. Cole of Newnan, Ga., and all of the drives except for the drier are operated by an RD8 Caterpillar engine. The drier is driven by a LeRoi gasoline engine. The plant is equipped throughout with Timken bearings and Link-Belt chain drives. The asphalt which was used on this job was Mexpet 30-40 penetration asphalt.

The mixes turned out by this plant for binder and top, under the Virginia Department of Highways specifications, were as follows for the 5,000-pound batches:

(*Concluded on page 38*)

PAVING A PARKWAY IN NEW YORK CITY



A new link between the Hutchinson River Parkway and the Bronx-Whitestone Bridge, Harlem Contracting Co., paving subcontractor. See page 13.

High and Low Level Concreting Outfit At Mahoning Dam

Dravo Corp. of Pittsburgh Developed Easy Shift for Concrete Chutes from Semi-Automatic Batching Unit

✦ AN interesting concreting plant and safety cantilever forms for the $5,000,000 Mahoning flood-control dam in Armstrong County, near Dayton, Pa., are features of the contract of the Construction Division, Dravo Corp. of Pittsburgh, Pa., contractor for the $6,870,000 project. The dam is 993 feet long, a maximum of 160 feet high from the stream bed and will contain 333,000 cubic yards of concrete, while the stilling weir below the dam will require another 9,600 cubic yards.

Aggregate Handling

All aggregates are delivered over a 3.75-mile spur track from a siding of the Pittsburgh & Shaumut Railroad, at McWilliams, Pa. The three coarse aggregates and one size of sand are dumped from the hopper-bottom cars into side-hill bins beneath a trestle immediately above the batching plant. These bins have a capacity of about 450 tons each and are built with concrete backing on the rock and at the lower end of each bin to retain the material. A Dravo traveling revolving crane, with an 89-foot boom and 2½-yard Williams clamshell bucket, moves the aggregate to the 4-compartment bin at the top of the batching plant. Each of these bins has a capacity of 30 tons.

The Three Mixes

The table below shows the dry weights of the three mixes used together with the amount of water specified:

Material	A	B	C
3 to 6-inch stone	....	2,070	2,120
1 to 3-inch stone	2,700	1,809	1,860
¼ to 1-inch stone	2,220	1,490	1,520
Sand*	1,836	1,840	1,850
Cement	1,034	752	640
Water	430	375	365
Water, gal./sack	4.7	5.6	6.4
Cement, sacks/cu. yd.	5.5	4	3.4

*Sand has a fineness modulus of 2.90

Mix A, containing the smaller aggregates, is used for thin reinforced-concrete sections. Mix B is used as a 5-foot veneer on the upstream and downstream faces of the dam and around all conduits as it is designed better to withstand weathering. Mix C is mass concrete for the major portion of the dam.

Batching and Mixing Plant

The batching plant is a complete Johnson unit with electric control and air operation. A selector switch on the control panel picks out one of three mixes from the three sets of scale bars on each of the cement and water-weighing batches and then the aggregate is batched by hand control while the cement and water are automatically batched. A graphic recorder, at the left of the operator, shows the weight and time of all batches, as a permanent record. The various aggregates, after weighing, are delivered to a hopper which is discharged to A or B mixer by a flap gate or to C mixer by moving the entire hopper. For easy control and reading, each of the scales is equipped with a Kron dial indicator which the operator watches during hand batching. A set of indicator switches immediately behind the operator indicate which one of the three mixes is being discharged, whether a batch is to be wasted or whether grout is to be mixed. A duplicate set of lights show below so that the bucket hooker, who rides the flat car with the concrete buckets, knows what disposition is to be made of the concrete as delivered.

In order to expedite the discharge of the cement, a vibrator has been placed on the side of the hopper. A battery of three 2-yard non-tilting Dravo drum mixers with General Electric 50-hp motors are timed electrically for a 2-minute mix.

High and Low-Level Delivery

A bank of five levers on the control floor makes it possible to deliver the concrete to the high-level trestle or to the low-level trestle. There are three hoppers for feeding the concrete from the three mixers to the buckets when the dinkey and flat car are operating on the upper level. For delivery to the second dinkey for the lower level the chutes are merely pushed over so that the back of each chute acts as the front of a chute which delivers all of the concrete to a single hopper which in turn feeds onto a Jeffrey loader which is equipped with vibrators. This loader delivers the concrete to a 146-foot belt conveyor 30 inches wide installed on a 30 per cent down grade, discharging into a double hopper which is equipped with a flap gate so that it feeds to the Dravo buckets on flat cars on the

(Continued on page 18)

C. & E. M. Photo

A general view of one of the two casting yards, showing the gantry, gang molds at the right, and curbs curing at the left.

Six Miles of Curb For Army Airport

Nelson Cement Stone Co. Precast 120 Curb Sections Per Day on Subcontract At Westover Field, Mass.

(Photos on page 48)

✦ ALL of the curbing using for treated gravel roads at Westover Field, the Army Air Base near Chicopee Falls, Mass., was produced just outside the reservation in two small casting yards set up temporarily and used alternately by the subcontractor, Nelson Cement Stone Co., Inc., of East Braintree, Mass. The curb sections are 6 feet long, 20 inches high and 6 inches thick at the top, with a 1½-inch radius at the front which is battered ½ inch in 6 inches. The contract called for the production of approximately 6 miles of this curb which required the casting of 120 units in each 8-hour day. This was done in one yard for a period of 10 working days, and then operations were shifted to the second yard while the cured curbs in the first were being removed and set.

The Yards

The two yards were identical, measuring approximately 125 feet by 35 feet in area. Each was spanned by a gantry which rolled from front to back of the yard, carrying a ½-ton electric chain hoist for handling the gang molds and the cast slabs. The yards were each planked to permit working immediately following heavy rains. The dual yards were located across the road from the concrete batching plant of P. J. Keating of Fitchburg, Mass., set up to supply batches for a fleet of truck mixers which serve all of the concrete needs of the Westover Army Air Base. The same

(Concluded on page 15)

Welding Reinforcing For Pit River Bridge

Reinforcing Is Heaviest Ever Used in Bridge Piers For Double-Deck Structure Near Shasta Dam Site

By HENRY W. YOUNG

(Photos on page 48)

✦ THE Union Paving Co., of San Francisco, Calif., contractor on the substructure of the Pit River Bridge, the closing link in the railroad and highway relocation near Shasta Dam, faced a difficult problem last spring when the subcontractor for welding the reinforcing steel gave up its contract and called it a day, leaving the Union Paving Co. with the job on its hands of getting together new equipment and a crew of welders to complete the reinforcing on the last pier.

This put somewhat of a task up to Superintendent H. L. Morisette and Engineer L. W. Hunt, but on March 21, when some of the accompanying detail welding photographs were taken, these concrete men had things going along smoothly and at a good pace, just as though this welding job, in certain respects unique in bridge building, had been right down their alley. By April 1, they were beginning to see the end of this spectacular job, as the American Bridge Co., contractor for the superstructure, was already erecting steel on the completed piers at the south end of the bridge while work was still going on on the substructure at the other end.

World's Highest Bridge Piers

The Pit River Bridge is the highest double-deck bridge and has the highest concrete piers ever built. Crossing the river 14 miles north of Redding, it will carry a four-lane highway on the top deck and on the lower deck a two-track railroad. There are ten piers in all and four abutments, two for the highway and two for the railroad. The design called for through truss construction for the railroad and deck truss for the highway.

The total length of the bridge is 3,687 feet, the longest span being 630 feet. Two of the piers are extremely high. Pier No. 3, 90 x 95 feet at the base, rising 357.5 feet from bedrock, while Pier No. 4, 95 x 95 feet, rises 362.5 feet above lowest bedrock. In these two piers the batter is 4 inches in 12 inches for the first 60 feet above the foundation block in one direction and 2 inches in 12 in the other. There the batter changes to ¾ inch in 12 and ¼ inch in 12 for 146 feet. In the final hundred feet, the batter is ⅜ inch in 12 and ⅛ inch in 12, respectively. As a consequence, the piers have a very graceful appearance, but most of this beauty will ultimately be hidden, as the water in the reservoir will come up to within 100

(Continued on page 8)

U. S. Engineer Department Photo

A general view of Mahoning Dam looking upstream from the stilling weir on the right bank and showing the two high-level gantries and, at left, the lower end of the concrete conveyor belt to the lower level.

Welders worked in confined spaces in the curtain of reinforcing rods for Pit River Bridge piers.

Illinois salvages 10 miles of worn highway

THESE PHOTOS TELL THE STORY
for the information of other Road Builders

1. Illinois decided to utilize 10 miles of Illinois State Highway No. 146, east of Golconda, as a base for a new pavement.

2. The old road was primed with a Texaco Rapid-curing Cutback Asphalt, applied at the rate of 0.10 to 0.12 gallon per square yard.

3. An Asphaltic Concrete Binder Course was machine-spread and compacted to a thickness of 1 inch.

4. Truck feeds mechanical spreader with Stone-filled Sheet Asphalt mix for the wearing surface of the new pavement.

5. A pair of 8-ton tandem rollers compact a section of the 1-inch Texaco Stone-filled Sheet Asphalt top.

6. The completed pavement is resilient, durable, easy-riding and skid-resistant. It was constructed by Charles F. Gilmore of Anna, Illinois.

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Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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Tunnel Engineer Given Place In the Cavalcade of America

The radio program The Cavalcade of America, sponsored by du Pont and devoted to the dramatization of the lives of people who have made outstanding contributions to the destiny and greatness of this country, recently presented episodes in the life of Clifford M. Holland, the tunnel builder.

Engineers and contractors rarely receive the credit they deserve. To our knowledge Clifford Holland is the first civil engineer to be accorded a place in the Cavalcade and it is gratifying that du Pont selected Cliff Holland, not only a great engineer, but a great man as well.

The radio presentation concentrated on Holland's compressed-air problems on the Hudson River Tunnel and emphasized the man's intelligence, his courage, and his knowledge of his work. But great as were those characteristics, we were even more impressed by two greater qualities—his relationship with his men and his concern for their safety and welfare. All who know any of the men who worked under Cliff Holland know of the admiration and affection, bordering on idolatry, with which his workers regarded him. There existed between them an unusual relationship, based on mutual esteem and regard, for Holland was a man capable of respecting spirit and skill and loyalty in any man. And that kind of mutual regard resulted in the type of cooperation which brought a difficult task to a successful conclusion.

Particular emphasis was placed on his struggle to eliminate the bends and other phases of caisson disease, and credit was given him for the use of a hospital lock, shorter working shifts, and the badges which all compressed-air workers now wear. In closing, it was pointed out that even greater than the six great subaqueous tunnels which stand as monuments to Clifford Holland was his medical report on the last tunnel he built, the one which now bears his name. Among the 2500 sand hogs who worked on the Holland Tunnel, not a single man lost his life due to compressed air.

And that was Clifford Holland's great triumph and achievement, for because of his efforts and his progress in the care of compressed air workers, hundreds of other workers on other compressed-air jobs since that time have worked more safely and with less ill effects. In this moment of the world's history, when the best brains and energies are forced to concentrate on tools of destruction, it is, we think, inspiring to stop and remember Clifford M. Holland's constructive efforts and achievements of greater safety for his fellow workers.

Snow Removal and Defense

The importance of snow-free roads will be far greater this winter than ever before, because of the miles of highways leading to and from manufacturing plants, sources of supply, and camps and cantonments, which must be kept clear of snow to keep supplies moving for America's speeded up production.

The burden of this will fall on the state and county highway departments, whose record of open highways during the winter months has grown increasingly better each passing year. But this year especially there must be no snow-clogged traffic arteries.

Therefore it behooves all highway officials to start *now* to plan for the months ahead. All snow-removal equipment should have been carefully checked and overhauled by now, but it is still not too late. Have you enough equipment on hand to meet any emergency? Is some of it obsolete and likely to break down under severe service, just when you need it most? Give thought to careful balance between plows and the horsepower of your trucks. Don't overload them and hasten the hour of breakdown. And lastly, place your orders for new units *at once*. It is never safe to wait until the last moment, and this year particularly it is necessary to order well in advance to insure having the equipment when you need it.

Role of Road Rollers In Earth Compaction

To the Editor
CONTRACTORS AND ENGINEERS MONTHLY

It is quite evident that the author of the article "Economies Possible in Compacting Fills" in your June issue is exceedingly well posted on the subject, but we can not entirely agree with him on his statements concerning compaction by road rollers. The briefness of his paragraph on the use of rollers would in itself lead to the belief that the conventional-type three-wheel road rollers are not suitable for compacting fills. The description of their operation on such work would lead further to such a conclusion.

For many years, three-wheel rollers have been used on fills with considerable success. It is only natural that they must be operated properly, and that the fills must be constructed in a manner that will obtain the best results.

I have no idea of starting any controversy on this subject, nor do I wish my remarks to be considered as partial to the rollers, due to my connection with the industry, but they are based on many years of experience in the equipment business and also on authoritative information obtained from men in high station in highway departments.

One of the latter, formerly connected with the Indiana State Highway Department, stated to me after reading the article in question, "In general, when soil or earth is too wet to roll with a three-wheel 10-ton roller, its moisture content is in excess of the quantity required to obtain the maximum density. Consequently, the performance of this three-wheel type is an automatic indication of too much moisture.

"Look at those poor guys, Joe. I bet they get tired, drilling all day."

"In Indiana for many years three-wheel 10-ton rollers were specified as the sole compacting agency for fill construction because of the excellent and satisfactory results secured. Fills up to 30 feet in height have received the pavement the same season with no appreciable settlement. Fills constructed of layers of soil having excess moisture content are inclined to be 'rubbery' and give trouble for years afterwards. A kneading action occurs, causing shifting of the subgrade. This is particularly noticeable in flexible-type pavements through the surfaces becoming wavy."

Information has reached me that several states during the past two or three years have made comparative tests which brought out the fact that three-wheel rollers are equally, if not more, desirable for rolling fills. With all this in mind, I do not believe that the author was "doing right by our Nell" when he inadvertently, at least, condemns this type of roller for the purpose indicated.

I might also say in closing that Indiana state specifications now indicate the amount of compaction required, but do not specify any method of rolling.

Carl G. A. Schmidt, Jr., Mgr. of Sales,
The Hercules Co., Marion, Ohio.

H. H. Bennett, Chief, Soil Conservation Service, U. S. Dept. of Agriculture

Charles M. Upham, Engineer-Director, American Road Builders' Association

Harris & Ewing Photo
Roy W. Crum, Director, Highway Research Board

NATIONAL AND SECTION JUDGES FOR OUR 1941 ROADSIDE DEVELOPMENT AWARDS

See Page 41.

L. D. Barrows, Chief Engineer, Maine State Highway Commission

Kenneth T. Brown, Landscape Engineer, Maine State Hwy. Commission

E. B. Lockridge, Chief Engineer, Indiana State Highway Commission

Henry J. Schnitzius, Indiana Landscape Supervisor

W. Vance Baise, State Highway Engineer of North Carolina

F. H. Brant, North Carolina Landscape Engineer

Photo by Brano
G. H. Otten, Oregon Landscape Engineer

R. H. Baldock, Chief Engineer, Oregon State Highway Commission

Hercules Powder Co. Buys Resin Business

The Hercules Powder Co., Wilmington, Delaware, announced recently the purchase of the synthetic resin business of John D. Lewis, Inc., Providence, R. I., a producer of synthetic resins. Through this transaction, effective July 1, 1941, Hercules acquired the land, buildings, equipment, and processes of the Lewis synthetic resin plant at Mansfield, Mass., and the entire plant at Brunswick, Ga.

Howard Bates, Vice President of the Lewis company, will join the sales staff of the Hercules Synthetics Dept., with headquarters temporarily at the Mansfield plant, which will be operated under the direction of R. F. Schlaanstine, with Dr. R. Marx as Technical Director.

Making Icy Roads Safe

Mid-summer may seem the wrong time to talk about icy highways, but experienced highway maintenance engineers know that the attack on ice problems must be prepared in advance, before winter is actually upon us.

One of the important solutions to the icy-road problem is the preparation and placing of abrasives at strategic points, ready for spreading on the highways. A folder entitled "Make Icy Highways Safe for Traffic", containing suggestions for the proper mixtures of sand or cinders and calcium chloride for effective ice control, is issued by the Michigan Alkali Co., 60 E. 42nd St., New York City. In addition, this folder also makes suggestions for the use of Wyandotte calcium chloride to melt the ice in frozen catch basins, storm sewers, and for the protection of bridge piers from dangerous ice pressure.

Copies of this folder may be secured direct from the manufacturer.

Trailer Patching Roller

The Littleford Trail-O-Roller, a motorized portable patching roller which will trail behind a light or heavy truck at any speed and when on the job works under its own power, providing compaction equivalent to a 5-ton roller, is described and illustrated by a series of job photos in a new folder issued by Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio.

LICKING AMERICA'S BIGGEST JOB

• Darkness doesn't stop defense work. On this earth-moving job in Georgia, a "Caterpillar" Diesel Electric Set (15,000 watts) furnishes current for powerful flood lights. With the light tower it can be moved to any location on the job, started up and left to run itself.

• At Camp Wolters, Mineral Wells, Texas, this "Caterpillar" Diesel No. 12 Motor Grader handles a tough road-building job. Big-blade capacity due to unparalleled traction spreads heavy gravel or crushed rock easily and steadily. The No. 12 is strong, fast working, economical.

• Six trips an hour on an 800-foot haul are made by the "Caterpillar" Diesel D8 Tractors with LaPlant-Choate Carrimor scrapers on this leveling job at Camp Clayton, Fort Ord, California. They have the raw power to pull big payloads and the stamina to keep going 20 hours a day.

WE DIDN'T have years to get ready for defense. We had months—and tough months too. Many of America's new training camps and airports, factory sites and naval bases had to be broken out of rock-hard, frozen ground or waist-deep mud. The fact that so many of these jobs have been done *ahead of schedule* is a tribute to the world's most efficient earth-movers—American engineers and contractors and the machines they use so well.

"Caterpillar" Diesel Tractors, Engines and Motor Graders on defense projects moved more than 500 million cubic yards in the first six months of 1941 and they're hitting a still faster pace today.

The same rugged power, dependability and economy that have built "Caterpillar" leadership are making history in the present emergency. And the men in the "Caterpillar" plant are working day and night to supply the vital needs of the nation's defense.

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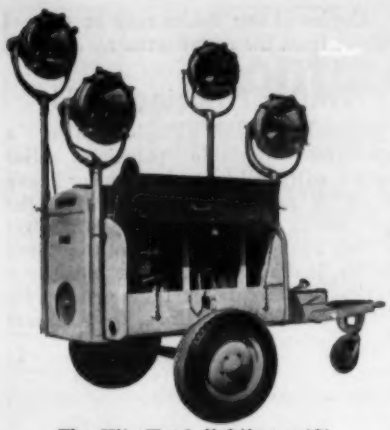

The Nite-Hawk lighting outfit.

New Floodlight Unit Is Readily Portable

The Nite-Hawk, a new portable floodlight unit just announced by Lister-Blackstone, Inc., 1706 So. 68th St., Milwaukee, Wis., is built to provide light where you want it when you want it. It is a fully self-contained source of light to fill the need on construction jobs, emergency work, and similar uses where connection to regular power lines would be impractical or impossible, or for service if power fails.

Four 1,000-watt wide-angle floodlights, one on each corner of the unit, cast powerful beams in the same or in different directions. Each light is individually operated from a control panel and is adjustable up and down and in all directions. The lights may be raised to a height of 8.5 feet and swung in a 180-degree vertical arc. Power is supplied by a LeRoi air-cooled 14-hp engine equipped with an electric starter. A 5,000-watt self-regulating d-c generator, connected to the engine, delivers direct current at 110 to 220 volts, the voltage being adjustable by means of a rheostat located on the control panel.

A steel enclosure with hinged side covers houses the entire assembly, including large tool boxes. Louvers at the generator end and an overhead ventilator permit air to escape when the housing is closed. The Nite-Hawk is mounted on heavy-duty multiple-leaf steel springs with two pneumatic-tired wheels. A retractable caster wheel is provided, enabling one man to move the unit about the job as required. The height of the unit, with the lights down, is 7 feet, it is 5 feet wide, 9 feet 4 inches long, and weighs 1,775 pounds.

Further information on the Nite-Hawk, which in addition to providing light has a control panel with receptacles for operating small universal hand tools such as electric drills, saws, hammers, etc., may be secured direct from the manufacturer by referring to this item.

Marmon-Herrington Keeps Pace with New Building

The plant of the Marmon-Herrington Co., at Indianapolis, Ind., has five times the capacity of a year ago and production has kept pace with new construction, according to a recent announcement by that company. By reason of careful planning, most of which was done before the present emergency, machine tools were ordered well in advance and man-power was ready to utilize each new building as rapidly as it was completed, company officials state.

The first expansion was doubling the size of the original truck assembly building, adding an entirely new floor on the administration building to house the greatly expanded engineering and drafting departments, and doubling the size of the machine shop where parts for Marmon-Herrington all-wheel-drive trucks, track-laying tractors and tanks are machined and finished. This was followed by the erection of a new assembly line building for tractors and tanks, another building almost as large for crating and shipping M-H units, with spur railroad tracks and inside loading platforms. Production flowed smoothly into these buildings as fast as they were completed.

At the present time, four additional separate building projects are rapidly nearing completion. When the entire expansion program as now planned is completed, the plant of the Marmon-Herrington Co. will cover approximately half of its 16 acres of ground which are surrounded by a high wire fence encircling the property.

Marmon-Herrington all-wheel-drive trucks and tractors are in extensive use in all types of construction, including needed defense construction, as well as in government service. In addition to its heavy-duty models, the company converts all standard Ford trucks to all-wheel-drive at its Indianapolis plant.

New Contraction Joints For Concrete Pavements

Keylode joints, made by the Highway Steel Products Co., Chicago Heights, Ill., are rigid fully assembled units for transverse contraction joints, ready to be spiked to the subgrade. Heavy plate shoes with arm braces are designed to insure uniform installation alignment of the dowel plate. The concrete slab edges are interlocked above and below the 12-gage key plate to transfer heavy traffic loads. Keylode contraction joints are furnished crowned or straight, and are shipped painted and greased.

Complete information on these joints may be secured by interested contractors and engineers direct from the manufacturer by referring to this item.

. . . . Get Yours?

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WATERPROOF CLOTHING

Boots
Clothing
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CATALOG No. 203

NEW CATALOG

You'll be interested in our new items. FLEXLACE Boot fits close to calf and ankle. Laces at top. "SSS LIGHTWEIGHT" Storm King Boot weighs 28% less than regular. PULL-OVER Boot for quick-on, quick-off, over street shoes. Many styles of rubber or oiled coats, suits, hats, etc.

GOODALL RUBBER CO.
25 S. 36th St.
Philadelphia, Pa. Date_____
Please send your New Waterproof Clothing Catalog No. 203.
Name _____
Company _____
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POWER — Horsepower travels at a gallop directly from motor to the Center Drive pinion and from there directly into hoist and swing (or travel) shafts. You can concentrate full engine power on any one operation or distribute it over simultaneous, synchronized operations for high speed performance.

STRENGTH — Center Drive results in utmost simplicity of design and that means fewer parts of greater strength. You don't have to pamper this machine because of size. It will dig anything that will go through the dipper.

CAPACITY — You can handle bigger pay loads per pound of weight with this ¾-yd. unit. Its patented Sloping Machinery Frame utilizes the machinery as "live counterweight" to obtain maximum lifting capacities.

UTILITY — This machine is a specialist in only one respect—moving more material, faster, at lower cost. As to type of boom equipment, take your pick of shovel, crane, dragline, clamshell, backdigger or skimmer. It handles them all with equal efficiency.

1 of 3 Lorains purchased by Nally & Mudd, Kentucky.

There's a copy of the new Lorain-40A bulletin that has your name on it. Write for it today.

UNIVERSAL CRANE DIVISION • THE THEW SHOVEL COMPANY, LORAIN, OHIO

3/4 YD. LORAIN-40 A

Selling the Public The Contract System

A Symposium of Ideas on Publicity for Contractors; How to Make the Public "Contract Conscious"

✦ PERHAPS not all contractors and engineers are diffident, modest and shy, but there is probably no other industry which publicizes its achievements less than the construction industry. No doubt there has been good reason for believing that the industry's accomplishments—our miles of good highways, sound and attractive bridges, great dams—speak for themselves and serve as better monuments to the effort, skill and knowledge of the engineers and contractors who designed and built them than mere words could ever do.

But during the past ten years the Federal Government has gone into business, particularly into the construction business. Accordingly it has become necessary for the construction industry as a whole to recognize the fact that it now has competition from the Government, and that the only way to continue its existence is to enlighten the public on the value to it of doing work *by contract,* of demonstrating that the contract system is quicker, more efficient, and more economical, so that public opinion will insist that public works, paid for by public funds, be constructed by contract.

Therefore we have asked a number of men prominent in contractors' affairs, some of them with considerable publicity experience, to join this symposium of ideas on publicity for contractors and the contract system.

Apathy Is the Enemy

O. W. Crowley, Executive Secretary, Central Branch of the Associated General Contractors of America, says that persons who have had any close association with construction by contract hold the apathetic belief that it is, or ought to be, no longer necessary to demonstrate the superiority of this method over the day labor, force account or WPA methods which misguided officialdom has foisted upon the public in ever greater volume in recent years. The honest, skilled and responsible contractor knows his work and his products are good, and too generally he takes it for granted that the public is equally well informed.

Mr. Crowley goes on: "The construction industry, on a nation-wide front, is assuming the obligations of construction of industrial plants, public works and military encampments on an unprecedented scale and under greater handicaps than ever before confronted the performance of a task of such magnitude. Construction has pledged its full capacity to the nation's need. It declared its readiness and its ability to take over the job and do it speedily, economically, soundly and patriotically. It stands to the credit of the administration that, despite its paternal yearning over the ranks of WPA pensioners, it did turn to contractors for its major projects. It imposed the conditions; the contractors accepted them and they have, probably more thoroughly than any other industry concerned with the defense program, done their job; done it on time; and done it well.

"This is a story that merits telling. It is one in the telling of which the entire industry and its sources of supply should cooperate. The manufacturers and distributors of construction equipment and the producers of construction materials look to contractors for their outlet. They have an interest in making the public understand that good construction necessitates not only the use of good equipment and the incorporation of good materials, but that both should be handled by men of skill, integrity and responsibility.

One of the signs being erected by A.G.C. members on their jobs this year. It has been suggested that to such signs might be added some information about the size and purpose of the contract, for the benefit of the public.

"Let the industry pull together for mutual and reciprocal advantages within its own ranks. When the public knows the truth, it will buy construction where it can get good construction—performed by men who have devoted a lifetime to better construction!"

Work as an Industry

E. C. L. Wagner, Manager of the A.G.C. of Missouri, says, "Public works

(*Continued on page 20*)

HEET-MASTER—SAVES 50% ON FUEL

HEATS TAR & ASPHALT TWICE AS FAST

Send for Bulletin No. 196 HEET-MASTER Kettles for

FREE on Contractors

AEROIL BURNER CO., INC.
5778 Park Avenue, West New York, N. J.
Chicago San Francisco Dallas

Wheel Bearing Lube that Stays *on* the Rollers and *off* the Brakes!

IN THESE DAYS of National Emergency, with extra-heavy loads and practically continuous service, your wheel bearings need a lubricant that stays in bearings and off brakes.

Realizing that ordinary wheel-bearing lubricants cannot meet present-day needs, operators of heavy-duty vehicles are changing over to *TEXACO MARFAK–HEAVY DUTY.*

TEXACO MARFAK–HEAVY DUTY is made especially for wheel bearings. Under the severest road tests, nationally prominent fleet operators have found *Marfak–Heavy Duty* so good in summer and winter that changing grades for purely seasonal reasons is no longer necessary.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has also made it preferred on many of the larger construction jobs everywhere.

These Texaco users enjoy many benefits that can also be yours. A Texaco Automotive Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

TUNE IN: "Treasury Hour—Millions for Defense." All-Star Radio Program. Every Wednesday Night, CBS. 9:00 E.D.T., 8:00 E.S.T.; 8:00 C.D.T., 7:00 C.S.T.; 6:00 M.S.T.; 5:00 P.S.T.

TEXACO

TEXACO Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

Reinforcing Welded On Pit River Bridge

(*Continued from page 2*)

feet of the highway deck.

Pier Reinforcing

Reinforcing of the concrete in the piers is unusually heavy. For the most part, 2-inch square rod was used. This is in the heavy curtains on all four sides of the piers and is probably the heaviest rod ever used as reinforcing in concrete work. Piers No. 3 and 4 are cellular in construction for a distance of 211 feet above the foundation block, and reinforcing was placed as a curtain around the faces of these cells, but in this case the rods were 1 inch square.

All of the 2-inch square rods were rolled especially for this job, in 60-foot lengths. They were placed with varying spacings, from 12-inch centers to less than 6-inch centers, in four parallel rows, forming a dense curtain of steel which from a distance looked almost like a canebrake.

The butt welding of all these rods has been a tough job, not only because of the size of the rods but because of the confined spaces in which the welders had to work in the case of the inside rows. This was particularly true where the batter changed. Here the upper and lower rods, at an angle, were interleaved where they met, making the space in which to work even more limited.

In setting up the steel, a heavy timber supporting structure was first erected, coupled with a steel rail falsework to support the reinforcing steel in place, preparatory to welding. The reinforcing rods were let down into place with the ends facing and the ends were then clamped together while the upper length of the rod was fastened to the falsework. It was exacting work and was done under subcontract by the Soule Steel Co. of San Francisco, which cut, bent and placed the steel in position ready for welding.

The specifications called for the butt welding of all rods by the following method. The ends of the rods were all beveled to an angle of 45 degrees. The lower end of each rod, where it opposed the upper end of the rod below, in addition to being beveled at 45 degrees was also beveled on each side at a 30-degree angle, bringing it down to an edge. By means of the falsework, this sharp edge was then held at a distance of 3/16 inch from the opposing face of the lower reinforcing rod. Special clamps were then used, as shown in one of the photographs, to maintain all rods in alignment and ready for welding, with the ends to be welded exposed. These clamps were placed above and below the weld points.

Before welding, the reinforcing rods were preheated to a temperature of 500 degrees for a distance of 9 inches on each side of the joint. For this purpose, ordinary gas jets were used, mounted in a row about 2 inches apart. Butane gas was used for this purpose, except in the coldest weather when "Uno" gas was used.

When the steel was hot, the welder made two passes at the apex of the angle on both sides, joining the edge of the upper bar with the flat surface of the one below. He then continued to lay on metal, peening at every pass, until the angular gap all around was completely filled and slightly rounded. The welding subcontractor used 5/32-inch Unarods, while the Union Paving Co., in finishing the job, used Fleetweld No. 7, as the welders seemed to be more familiar with it.

The welding equipment for this job included four Lincoln arc-welding machines, one Hobart and one General Electric, all of 300-ampere capacity. Amos Bowmer was in charge of welding after Union took over this work.

The total welds of all kinds numbered 8,000. On Pier 4 alone there are 3,866 welds and on Pier 3, 2,926 welds. Altogether the reinforcing steel weighs 10,930,000 pounds.

Tests for Welders

It wasn't any too easy to secure welders on this location. In the first place,

(*Concluded on page 24*)

Tough Babies for Tough Business

IF YOUR HAULING or delivery jobs come tougher than most—match them with Ford Trucks—the Trucks that are built tough for tough assignments!

Ford Trucks give you a choice of engines—95 or 90 hp V-8 or super-economy 30 hp "4". You pick the right Ford power for the job you have to do!

Ford Trucks have tough, rugged frames. Springs are extra heavy. Ford hydraulic brakes have extra large drums; clutches are oversize. The Ford cooling system has *extra* capacity. Ford rear axles are noted for long, trouble-free performance. At *all* points where stress occurs in normal use, Ford Trucks are plenty tough.

They're thrifty, too. Easy on oil and gas. Light on service costs. Low in first cost.

Your Ford Dealer can show you just how practical a Ford Truck is for your work. Why not ask him about an "on-your-job" test today!

Ford

FORD TRUCKS

AND COMMERCIAL CARS

New National Airport At Washington, D. C.

Preparation of Site with Dredged Fill of Sand and Gravel; Mt. Vernon Highway Relocated to Enlarge Area

✦ THE great Washington National Airport has become a reality in the comparatively short time since November 29, 1938, when the site was a swamp traversed only by the Mount Vernon Memorial Highway. The work was placed in charge of the U. S . Engineer Department, Corps of Engineers, U. S. Army, which made use of hired equipment, relief labor, and contract work to push the project to completion for use which began with the airlines moving in June 1, 1941, and with initial flights starting June 15.

A choice of seventeen sites made the final selection difficult. Careful consideration was given to costs, accessibility to the heart of the Nation's Capital, and freedom from obstruction. The question of closeness to the city was considered as a time element rather than distance, so as to avoid traffic jams. Further consideration was given to the amount of land necessary to purchase, and to the cost of construction. Of the total of 729 acres for the site finally chosen it was necessary to purchase only 89 acres from private owners. As regards the cost of construction, dredging to provide the necessary fill for the area cost only 16.5 cents per cubic yard, while the minimum cost for dry excavation at other sites would have been 30 cents.

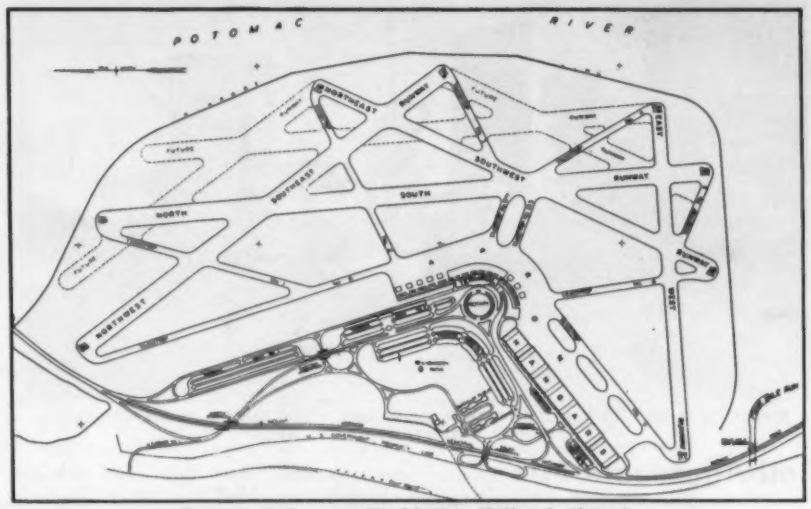
The Washington National Airport is located on the shore of the Potomac River opposite Washington, D. C., and 3.5 miles by highway from the Old Post Office in Washington. Of the 729 acres in the port, 173 acres is covered by the Terminal Building and hangars, while the balance of 556 acres is landing area. Congress, through various agencies, made a total of $16,000,000 available for the construction of this project.

Dredging

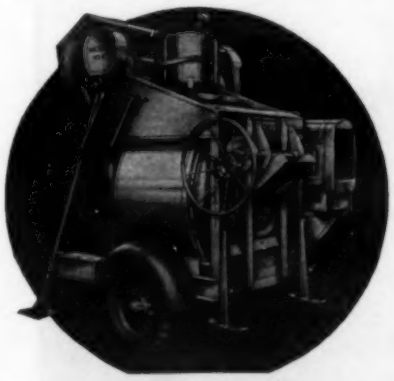
A total of 18,479,000 cubic yards of sand and gravel was dredged from selected borrow areas in the shallow Potomac River off Gravelly Point, the site of the airport, in one year by three dredges hired on an hourly basis and one furnished by the Government. The dredges had discharges of 18, 27, and 28 inches; and the average cost of placing the hydraulic fill was 16.5 cents per yard.

A surcharge of 6 to 8 feet of gravel was placed on the runway areas to accelerate settlement on the soft swamp area, and selected material from this surcharge was bulldozed to each side of the runways to provide an effective landing strip 500 feet wide. In addition, excess gravel was pumped in by the dredges beyond the amount actually needed for filling, to provide a source of gravel for the initial contract for runway paving and for all building concrete. The area upstream and downstream from the borrow area used for filling in the airport site has been worked for many years by commercial sand and gravel producers, so that the material is well known. The excess gravel was processed by the U.S. E.D. with a Pioneer sand and gravel plant, to furnish aggregate for building concrete. The cost of the plant was writ-

(*Continued on page* 32)



Layout of the new Washington National Airport.



Demand These Features in Your MIXER!

- AUTOMOTIVE-TYPE TRANSMISSION, 30% to 40% more efficient, quieter, longer lived.
- HIGH CARBON MACHINED STEEL DRUM TRACKS, on chilled, ground rollers.
- 5S TO 14S ALIKE IN ALL BUT SIZE—real heavy duty service in light, fast, end discharge trailers with 2 or 4-wheel mounting interchangeable. Jaeger Criss-Cross "Re"-Mix Drum, Skip Shaker Loader, fastest "Pressure" Discharge — features that have made Jaeger the world's biggest selling line.

3½S with Measuring Batch Hopper Mixes 30% to 40% More!

Send today for new catalog and prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

AMERICAN CABLE

TRU-LAY *Preformed* Wire Ropes

ARE UNIFORM

UNIFORM IN QUALITY This is a universally acknowledged characteristic of American Cable's Wire Ropes.

UNIFORM IN SERVICE Being uniform in quality, American Cable's Ropes are naturally uniform in service. When American Cable introduced TRU-LAY Preformed, in 1924, we gave all industry a rope that far outlasted ordinary non-preformed, our own make included. Here, too, in increased service, there is uniformity for when one TRU-LAY Preformed Rope does a job unusually well, the second or twenty-second TRU-LAY Rope will do equally well.

UNIFORM IN SAFETY TRU-LAY Preformed is a safer rope. Its crown wires lie flat and in place so that there is less danger of their wickering out and jabbing workmen's hands, which often causes blood-poisoning. TRU-LAY handles easier and faster, resists kinking and whipping, spools on drums better and rotates less in sheave grooves. TRU-LAY requires no seizing when cut and will not fly apart. Specify American Cable's TRU-LAY Preformed for your next line. All American Cable Ropes made of Improved Plow Steel are identified by the Emerald Strand.

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In Business for Your Safety

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ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

The circular test track at Michigan State College where studies of stabilized soil-aggregate mixtures are being made.

Soil-Aggregate Mix Research Studies

A research project is now under way at Michigan State College designed to improve the serviceability of soil-aggregate mixtures as road bases and surfaces. The program is being conducted by the Research Division of the Michigan State Highway Department under a fellowship sponsored by the Calcium Chloride Association in collaboration with the Engineering Division of the College.

The investigations are being made on a circular test track with equipment designed to simulate the action of traffic. Differing proportions of soil-aggregate mixtures are placed in the track and then subjected to thousands of trips by a pneumatic-tired treadometer weighted to 800 pounds per inch of tire width. The plasticity indices of the sections are varied, and part of each section receives calcium chloride treatment, either as an admixture or by surface application, while others are left untreated. Comparative studies are then made on rates of compaction, the densities attained, the amounts of surface disintegration, the effects of subgrade and surface water, etc.

An example of the type of information being developed is shown in the following test results from a recent progress report: Sample No. 2, a soil-aggregate mixture with sieve analysis showing 98 per cent passing a ¾-inch screen, 80 per cent passing a No. 4 screen, 69 per cent passing a No. 10 screen, 46 per cent passing a No. 40 screen, 24 per cent passing a No. 200 screen; plasticity index 0. A 6-inch layer of this material was placed in the track on top of a 12-inch graded gravel base, and calcium chloride was added at a rate of 2 pounds per square yard of surface. Water levels were progressively raised until, at 100,000 revolutions of the treadometer, the level was 3 inches below the surface. After 125,000 revolutions of the treadometer, the soil-aggregate surface remained in good condition with no signs of ravelling, showed very little settlement, and had a density of 157 pounds per cubic foot.

Previous similar tests by the Public Roads Administration showed that chemical treatments proved beneficial in the construction of bases for bituminous surfaces and that when calcium chloride was added as an admixture the test road was compacted in less than one-third the wheel trips required to produce a similar condition without the admixture.

The Michigan program of tests will study the behavior of stabilized soil-aggregates as a wearing course under wet and dry conditions and the control and treatment of consolidated gravel surfaces under calcium chloride maintenance. It is planned to coordinate this work with service behavior and economics studies being conducted by the Maintenance Division of the Michigan State Highway Department, which maintains an extended system of low-cost dustless roads in its tourist service program.

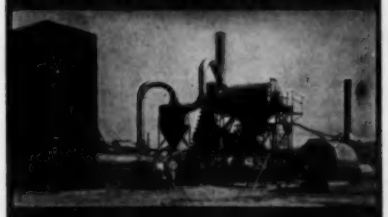
Airport Runway Problems

Adequate airport runway design and construction are of major importance at this time, with current defense plans calling for greatly expanded airport facilities throughout the country.

A new bulletin, "Airport Runway Design Data" containing recommended slab reinforcement and joint construction for concrete runways and aprons, has been issued by the Laclede Steel Co., St. Louis, Mo. This company states that the recommended design for airport runway reinforcement contained in this bulletin has proved typical of numerous army and municipal constructions during the past few months. The design data is composed of text and diagrams which should be of interest to contractors and engineers.

Copies of this bulletin, as well as of a catalog on Laclede reinforcing and joint steel for concrete pavements on highways and airports, may be secured direct from the manufacturer or from this magazine.

YOU CAN FIND A PROFIT IN SMALL JOBS WITH THE RIGHT KIND of EQUIPMENT



And MADSEN has a small asphalt plant to meet your requirements

Two plants in small capacity sizes: a 500-lb. batch size, and a 1,000-lb. batch size; complete with elevator, dryer, 4-size screening, accurate weighing through multiple beam scales, asphalt injection and a twin-shaft pug mill mixer.

A complete plant unit, portable, within width, height and weight requirements for moving on any highway. Madsen engineers, pioneers in portable and stationary asphalt plant equipment, have scored another hit in this truly outstanding equipment.

MADSEN IRON WORKS

HUNTINGTON PARK, CALIFORNIA

DEFENSE LOADS on power units and machinery demand non-failing lubrication. For *CONSTRUCTION MACHINERY* there are . . .

. . . SINCLAIR SPECIALIZED LUBRICANTS, both oils and greases, designed for the *safe* lubrication of equipment in "all out" service. Try Sinclair lubricants for keeping operating hours up and overhaul costs down. For details or lubrication advice write nearest Sinclair Office or Sinclair Refining Company, 630 Fifth Ave., New York, N. Y.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

EQUIPMENT *of Central Engineering Company (Davenport, Ia.) at work on Santee-Cooper project, Moncks Corner, S. C. Sinclair lubricants used.*

SINCLAIR LUBRICANTS-FUELS

SINCLAIR REFINING COMPANY (Inc.)

2540 West Cermak Road, Chicago • 10 West 51st Street, New York City • 1907 Grand Avenue, Kansas City • 573 West Peachtree Street, Atlanta • Fair Building, Ft. Worth

New Bulletins on Mixer For Mixed-in-Place Jobs

A new 4-page folder on the Ariens Aggmixer for pulverizing aggregate and mixing it with a stabilizing agent or binder of any type, including bitumen, cement, clay or chlorides, on all types of mixed-in-place road jobs has recently been issued by the Ariens Co., Brillion, Wis. This Aggmixer, of simple design and sturdy welded construction, is mounted on heavy-duty tires and can be pulled by any type of tractor. The tines are of chrome vanadium steel in a resilient rubber mounting, and the unit is equipped with Timken bearings, entirely enclosed.

Copies of this new folder, No. 541, as well as a number of job bulletins illustrating and describing the Aggmixer in use on oil-sand construction, soil-cement road work, bituminous stabilization and black-top construction on actual jobs throughout the country may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

Anniversary Booklet Of Air Cleaner Company

To the engineers whose creative genius has given the United States her leadership in power-unit manufacture, the Donaldson Co., maker of oil-washed air cleaners for gas and diesel engines, has dedicated its anniversary booklet commemorating the 25th anniversary of that company.

This interesting and well-illustrated booklet tells the story of the Donaldson Co., from its beginning in 1915 when Frank Donaldson, a tractor salesman, called in to struggle with a balky tractor, concluded that the trouble was the choking invasion of dust in the motor, through the development of the Donaldson oil-washed air cleaner, to its present-day status. Pictures of the company staff and plant, of the various types and sizes of Donaldson cleaners, and of the many different types of equipment, including tractors, shovels, dirt-moving units, loaders, bituminous mixers, trucks, graders and other automotive machinery on which Donaldson air cleaners are used, are included.

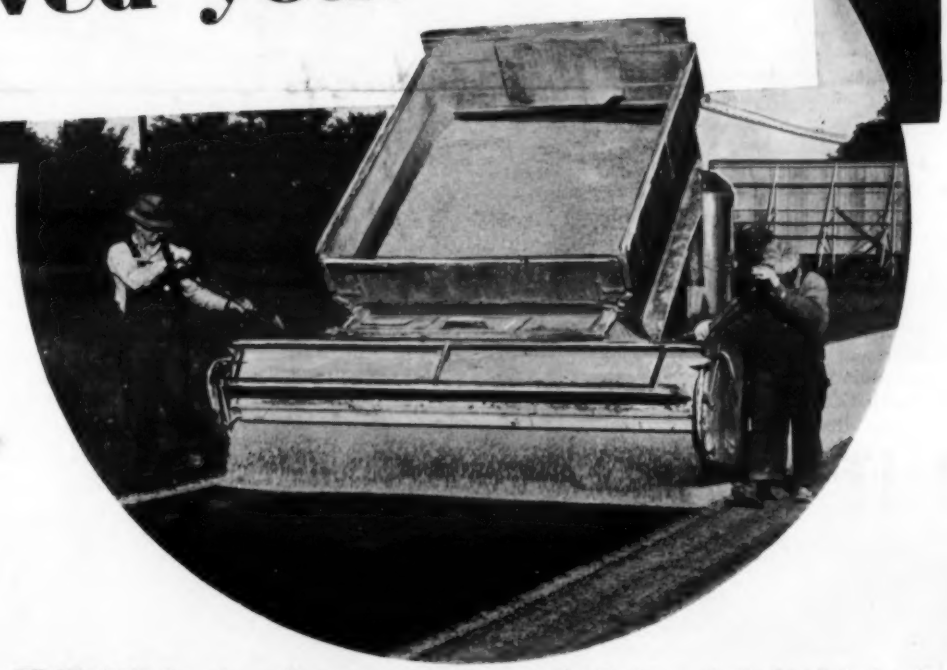
A limited number of copies of this interesting 25th Anniversary Booklet may be secured by interested contractors and state and county highway engineers direct from the Donaldson Co., 666 Pelham Blvd., St. Paul, Minn., by mentioning this magazine.

Jones & Laughlin to Expand

According to an announcement received from the Jones & Laughlin Steel Corp., Pittsburgh, Penna., an extension to its present wire rope plant at Muncy, Penna., and the installation of additional equipment have been authorized. Work has been started on a 120 x 275-foot addition to the plant to house a new closing machine which fabricates the strand into finished rope, and to provide warehouse space. A new office building is also being constructed.

We asked 100 Owners

"How much have your Buckeye Spreaders saved you?"



Their Answers will interest everyone looking for lower costs or larger profits on spreading jobs!

". . . on this one 13 mile job spreading coarse sand about $1,000 saving!"

"Due to the uniform spread there is a saving of at least 20% on material."

"Depending on the size of the job, at least a saving of 25% over other methods."

"A saving of about 50% in hand labor as compared to that required with equipment previously used."

"Saving in time, raking, brooming, and material has amounted to quite a few thousand dollars."

"Through labor saving and accuracy conservatively saves $50 per day when in use."

"Approximately $25 per mile."

"We save on material—a uniform spread takes from 30% to 50% less."

"Saves labor, truck time and material."

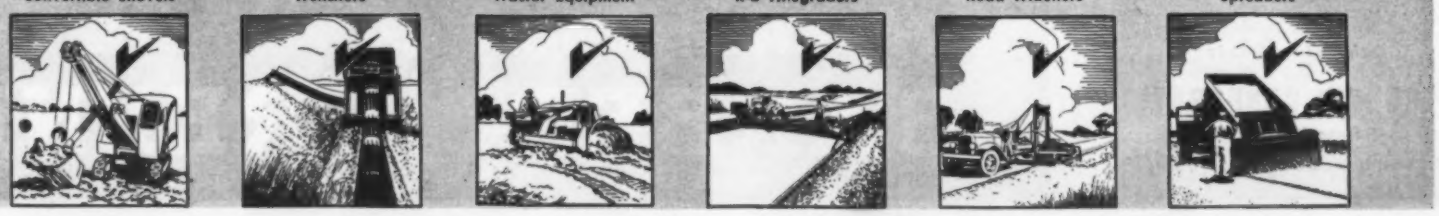
**There are dozens of reports like this in our files.*

BUCKEYE Spreaders will save you money, too! The Buckeye spirally-fluted feed roll, transmission-driven in direct ratio to spreader speed, *grips* the material and distributes it accurately and evenly. The Buckeye truck hitch permits one man to quickly couple or uncouple spreader from truck. Buckeye wheels are placed well in from ends of box to allow spreading close to roadside obstructions. These and many other Buckeye construction features save time, money, material, labor and truck time and produce a better, longer-lasting road surface.

Built in 9, 10, 11, 12 and 13 foot widths. For complete details, write to Buckeye for new Spreader Bulletin.

BUCKEYE TRACTION DITCHER CO., Findlay, Ohio

Built by Buckeye



The new Blaw-Knox Hi-Lo roller-gate concrete bucket.

New Concrete Bucket

A new model roller-gate concrete bucket, which will receive a concrete charge either in upright position or lying down, has recently been developed by the Blaw-Knox Co., Pittsburgh, Penna. This bucket, known as the Hi-Lo charge model, has a receiving hood and skids as illustrated. These attachments permit laying the bucket down to receive its full rated load from a truck mixer. When lifted, the bucket assumes its normal upright position for discharge.

The Hi-Lo bucket is available in 1, 1½ and 2-cubic yard sizes. The attachments by which a standard Blaw-Knox roller-gate concrete bucket may be converted to a Hi-Lo model are also available for these same sizes. These attachments increase the weight of the bucket 240, 290 and 325 pounds, respectively. This new bucket is a single-line type which features the recently developed improvements in Blaw-Knox bucket construction. The roller-gate design permits easily and accurately controlled discharge of low-slump concrete, and is equally suited to handling grout.

Further information on these buckets is contained in a new Blaw-Knox catalog No. 1816, a comprehensive summary and operating story of all types of concrete buckets, copies of which may be secured direct from the manufacturer or from this magazine.

New A.I.S.C. Dist. Engr.

Announcement has been received from the American Institute of Steel Construction, 101 Park Ave., New York City, of the appointment of Joseph M. Marshall, Jr., as District Engineer, with headquarters at Atlanta, Ga. Mr. Marshall will represent the Institute in the territory embracing Virginia, eastern Kentucky, North Carolina, South Carolina, Tennessee, Georgia, Alabama and Florida.

Protective Compounds For Concrete and Metal

Jennite products, a durable coal tar pitch emulsified and neutralized by an exclusive process, are designed for a wide range of uses in providing a waterproof coating for concrete structures, floors or roadways, protection against rust and corrosion for pipe lines, structural steel, bridges, etc., or as a preservative for wood fence posts, guardrail posts or wooden bridges. Jennite, which is manufactured by the Jennison-Wright Corp., Toledo, Ohio, exclusively for Maintenance, Inc., Wooster, Ohio, is available in black only, but once cured it may be given a coat of oil paint in any desired color.

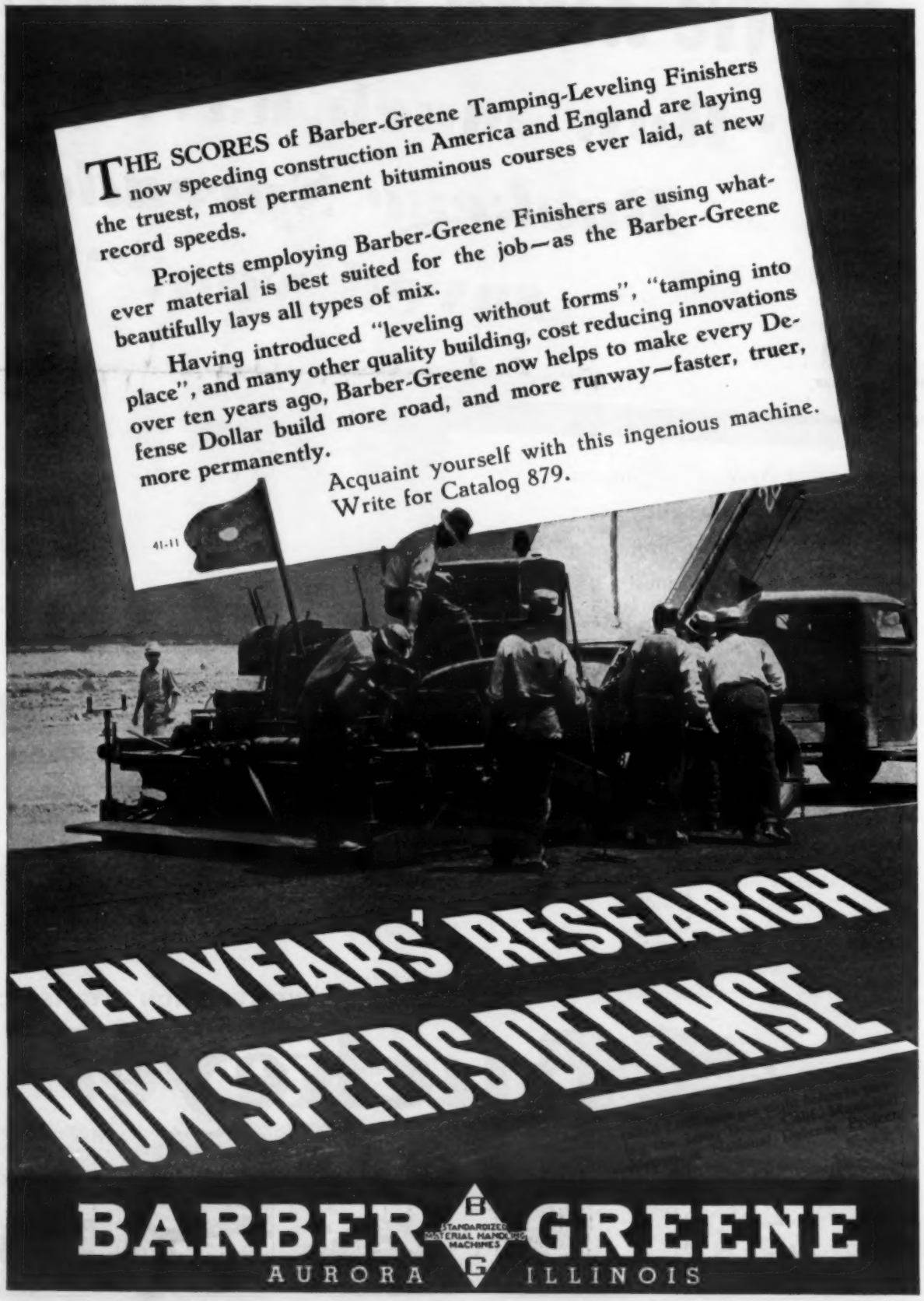
Further information on the line of Jennite products and their many uses may be secured by interested contractors and state and county highway engineers direct from Maintenance, Inc.

Wheelbarrows and Defense

A complete but simplified line of wheelbarrows of the types necessary on most defense and other types of construction jobs is described and illustrated in a new bulletin issued by the American Steel Scraper Co., Sidney, Ohio. In addition to describing the barrows made by this company, including the American deluxe concrete barrow, the contractors' general purpose barrow, the deluxe heavy-duty industrial barrow, the contractors' and industrial all-steel general purpose barrow and the deluxe pilot general purpose barrow, this bulletin points out that steel and rubber can be conserved by specifying standard models equipped with pneumatic-tired wheels. It is stated that the American Safetyizing process doubles the life of pneumatic tires, and that a pneumatic-tired wheelbarrow outlasts other types.

Copies of this new red, white and blue folder may be secured by interested contractors and state, county and town highway officials from the manufacturer.

CUT Repair Costs in Half
With this new "Simplified" Arc Welding. Eliminates costly delays and expensive replacement parts that cut profits. No more waiting for parts or tearing down equipment with a Hobart on the job. Used by leading contractors the country over.
Free! Valuable booklet on new welding applications . . . write for it.
HOBART
"One of the World's largest Builders of Arc Welders"
HOBART BROTHERS CO., Box CE-81, TROY, OHIO


THE SCORES of Barber-Greene Tamping-Leveling Finishers now speeding construction in America and England are laying the truest, most permanent bituminous courses ever laid, at new record speeds.
Projects employing Barber-Greene Finishers are using whatever material is best suited for the job—as the Barber-Greene beautifully lays all types of mix.
Having introduced "leveling without forms", "tamping into place", and many other quality building, cost reducing innovations over ten years ago, Barber-Greene now helps to make every Defense Dollar build more road, and more runway—faster, truer, more permanently.
Acquaint yourself with this ingenious machine. Write for Catalog 879.
41-11
TEN YEARS' RESEARCH NOW SPEEDS DEFENSE
BARBER GREENE
STANDARDIZED MATERIAL HANDLING MACHINES
AURORA ILLINOIS

DO IT NOW

Write for illustrated Catalog "L" which describes in detail the full line of Ross snow plows for trucks and tractors.

The plows with the original "Sno Flo" mouldboards.

Right up to the minute with many refinements and improvements.

Engineered and built by

The BURCH CORPORATION

Crestline, O.

Builders of Equipment for more than Fifty Years

Concrete Pavement On N.Y.C. Parkway

Two 3-Lane Roadways with Medial Strip Will Connect Hutchinson River Parkway With Whitestone Bridge

✦ AN important extension of an existing parkway is now being completed by the New York State Department of Public Works as agent for the Triborough Bridge Authority just inside the northern boundary of New York City. The contracts awarded extend the attractive thoroughfare of the Hutchinson River Parkway from a branching near its present southern terminus to a junction with Eastern Boulevard adjacent to the entrance plaza of the new Bronx-Whitestone Bridge. The total project is 19,448 feet long and involves the construction of a bascule bridge, railroad grade separation and several underpasses to separate traffic at crossings with other main arteries, and dual 36-foot reinforced-concrete roadways separated by a grass plot varying from 9 to 20 feet in width. Carefully designed entrance and exit roads of two lanes provide access and eliminate any crossing of traffic on entering or leaving the parkway at any point.

The section to which this paving article is devoted is a portion of the work for which the National Excavation Corp. of New York City, was the general contractor. The subcontractor on this 2,300-foot paving job was Harlem Contracting Co., Inc., of New York City. The work starts at the junction with the Hutchinson River Parkway and extends to the bridge crossing Eastchester Creek. A feature of the work to the south was the placing of a heavy embankment through a long section of the project on low ground by self-containing hydraulic dredges which pumped sand taken from the lower Bay into a stockpile along Westchester Creek and then placing it by hydraulic dredging from there.

Preparation for Pouring

Following the rough grading, the form trenches were cut with a Caterpillar diesel-powered grader, and then two form setters with two helpers laid out the Blaw-Knox steel forms. The preliminary fine grade was prepared on the subgrade by six men with hand shovels, and then checked with a scratch board. The grade was then rolled with a Buffalo-Springfield 1½-2-ton tandem and checked with a second scratch board, pulled by two men who filled in the final low spots which were then rerolled. As this contractor does considerable work of this type, all scratch boards are prominently marked with the thickness of the slab and its width. Thus the boards used on this job were marked in large numerals "8 x 12" indicating an 8-inch thickness of slab and a 12-foot width.

Expansion joints on this contract were set uniformly 94 feet 6 inches apart and at all PC and PT as well as at all grade changes. The specifications required the placing of a redwood board 1 1/16 inch thick with no crown and set ½ inch below the top of the concrete. It carries seven, eight, or nine Godwin load-transfer units for each expansion joint. One man placed all the expansion joints, using two heavy pins at each side at the ends and two single pins toward the middle of the joint on the side away from the approaching paver.

Concreting

All batching was done at the commercial plant of McCormack Transit Mix Concrete Co., Inc., requiring a 55-minute round trip almost entirely through city streets and all in heavy traffic. The producer used a fleet of eleven Mack trucks with Cummins diesel engines, hauling four batches per load. In spite of this fleet, delays on the road prevented constant operation of the paver and thereby prevented its reaching maximum capacity each day.

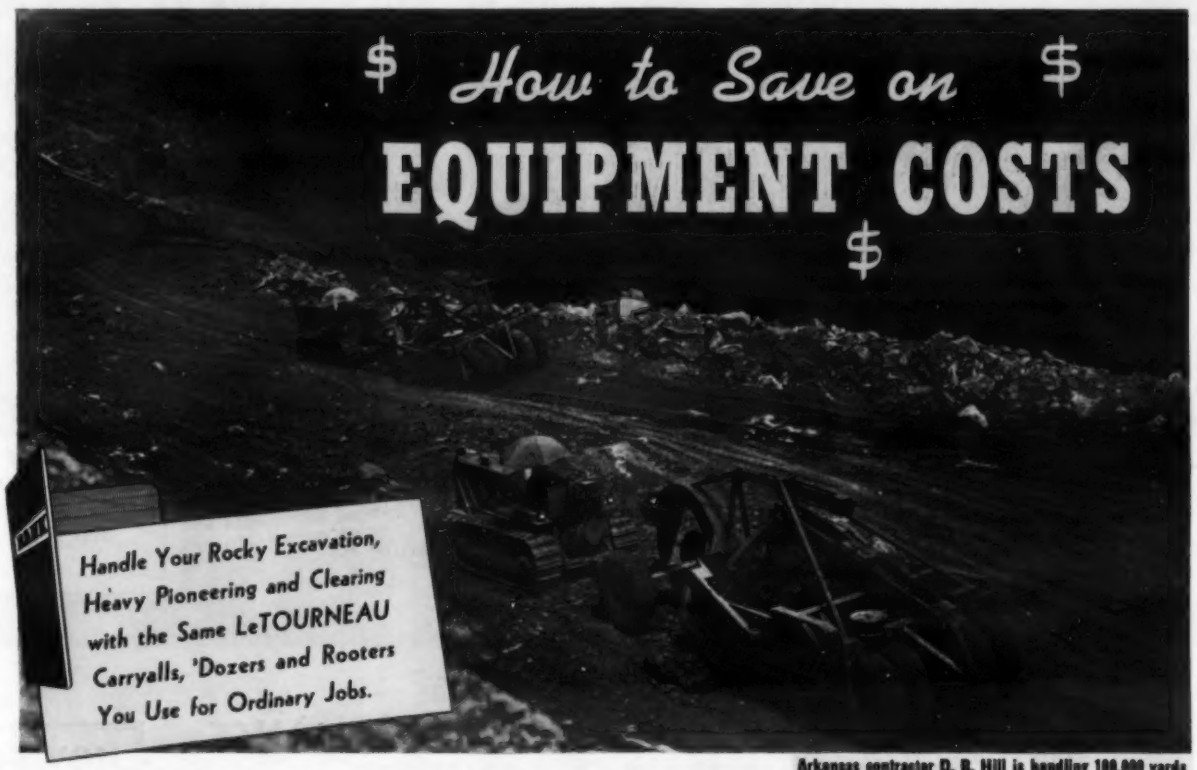
The batch weights were:

Sand	1,720 pounds
Stone, No. 1 and 2	1,311 pounds
Stone, No. 3-A	1,600 pounds
Portland cement	708 pounds
Natural cement	118 pounds

(*Continued on page* 26)

C. & E. M. Photo

A redwood board with Godwin load-transfer units at the expansion joint, and the tie-bar dowels at the sides.



Arkansas contractor D. B. Hill is handling 100,000 yards of rock, clay and sand on Hy. 11, near Huff, Arkansas, with these two LeTourneau Carryalls and three 'Dozers.

SCORES of alert, profit-minded earthmovers have discovered that the same LeTourneau Carryalls, 'Dozers and Rooters, which make "duck soup" of ordinary dirt, also eliminate the need for extra equipment in rocky jobs like these. They're built extra-rugged by LeTourneau all-steel construction, electric arc-welded throughout, to profitably handle hardpan, shale and gumbo with a minimum of lost time; they're powered by fast-acting LeTourneau cable control for lowest cost operation.

Rooters Save Blasting

The extra-heavy-duty LeTourneau Rooter, for instance, is built strong enough to take full pull of two "Caterpillar" D8 tractors on a single shank, to break up all materials short of solid rock. For lowest cost removal, LeTourneau 'Dozers can be teamed with Rooters—to 'Doze and Root with the same tractor and LeTourneau Power Unit—thus, further reducing equipment cost on pioneering, clearing and hauls up to 200 feet.

To break up Michigan sandstone, this LeTourneau K30 Rooter took full pull of two "Caterpillar" D8 tractors on a single shank . . . saved blasting.

"Scraper with a Backbone"

On longer hauls, LeTourneau Carryall Scrapers dig, haul and spread big loads of the toughest materials without undue body strains, twisting, distortion or buckling. That's because they're built *like a box* . . . with sides and ends stoutly welded together by rugged overhead "A" frame, spring pipe and bracing. This additional overhead support eliminates the inherent weakness of ordinary open-body type scrapers. Double bottom, heavily reinforced . . . cable up out of load to eliminate wear from abrasive materials . . . are a few other money-saving LeTourneau Carryall features that add up to long equipment life and *lowest net-cost-per-yard.*

Jobs like this used to be shovel work. Thois Brothers, Brisbane, Queensland, Australia, took out this rock bank with their LeTourneau Angledozer and "Caterpillar" D8 tractor.

See for yourself how LeTourneau Carryalls, Rooters and 'Dozers can lower earthmoving costs on all your jobs. Get in touch with your LeTourneau-"Caterpillar" dealer TODAY!

LETOURNEAU
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA
Cable address "BOBLETORNO"

For Lowest Net Cost per Yard

CARRYALL* SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, TRACTOR CRANES, PUSHDOZERS, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNATRAILERS*, TOURNACRANE.

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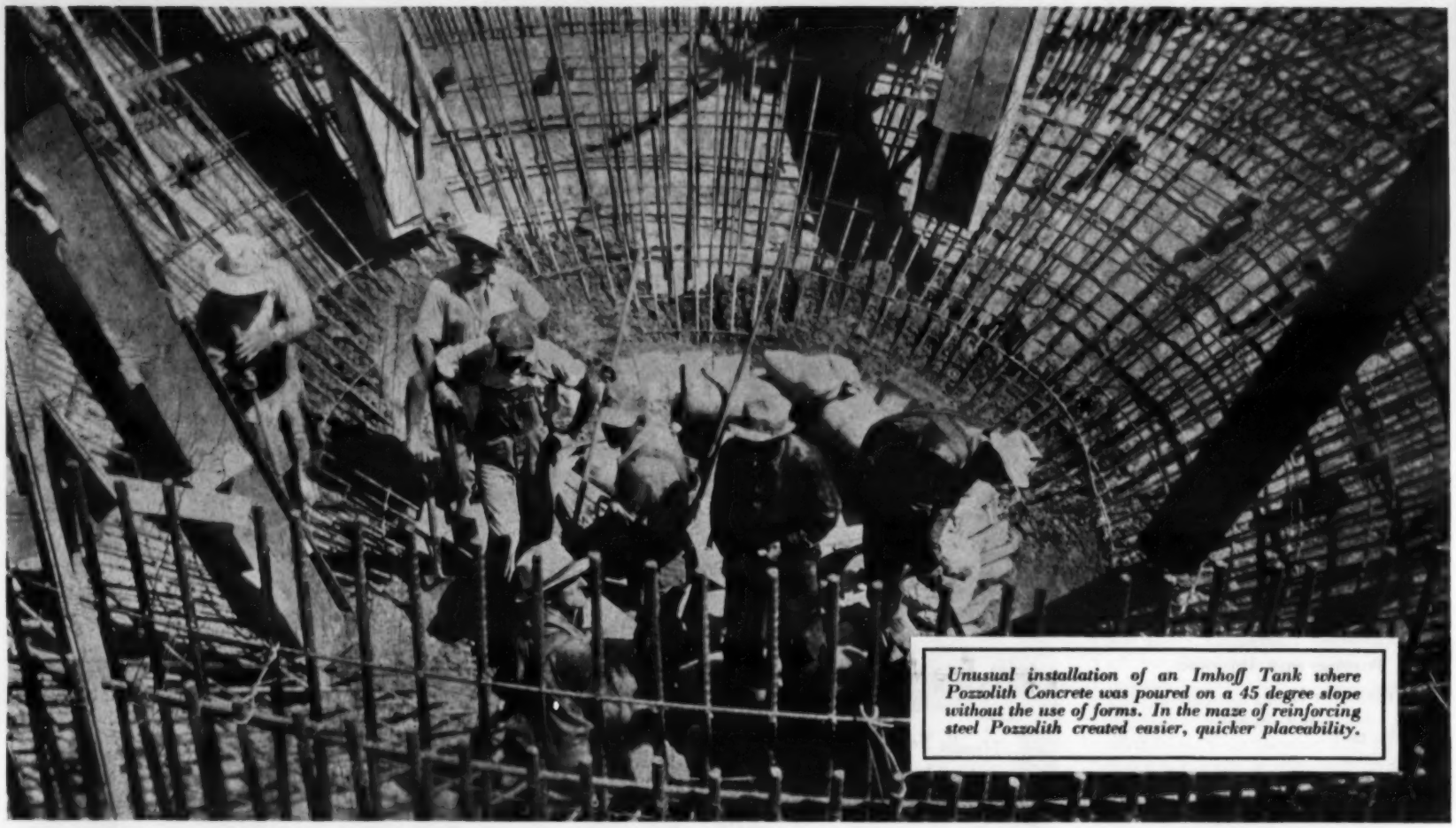
CEMENT DISPERSION
and its five advantages
OBTAINABLE WITH POZZOLITH



Unusual installation of an Imhoff Tank where Pozzolith Concrete was poured on a 45 degree slope without the use of forms. In the maze of reinforcing steel Pozzolith created easier, quicker placeability.

AN OUTSTANDING TECHNOLOGIC ADVANCE THAT BENEFITS ALL CONCRETE

Application of the Principle of Dispersion through POZZOLITH raises the efficiency of portland cement to the maximum and produces these advantages:

1. Durability increased 50% or more.
2. High Early Strength — 20% or more increase in compressive strength at all ages.
3. Water reduction, up to 20% — slump increased 150% or more for given water ratio.
4. Increased water-tightness — 20% or more reduction in absorption and permeability.
5. Reduced bleeding and segregation.

SPEED AND ECONOMY

In addition to the above advantages POZZOLITH speeds up the job but adds no increased over-all cost and in many cases substantial savings are made.

WIDELY USED

Ten years of use by representative engineers, contractors and owners, everywhere, have now made its acceptance general.

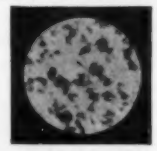
MAKES ALL THE CEMENT WORK

Today hundreds of thousands of cubic yards are being placed on defense and industrial projects more quickly, more easily, and with greater economy through the cement-dispersing ability of POZZOLITH which exposes the entire surface area to the water and thus makes all the cement "work".

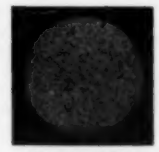
The complete story of Cement Dispersion and POZZOLITH will be sent on request.

HOW POZZOLITH WORKS

Pozzolith contains Master Builders' cement dispersing agent. Cement particles in their normal state in water tend to gather together in bunches; i.e., flocculate. This bunching entraps water within the particle clumps. See microphotograph at right.



UNDISPERSED



DISPERSED

With Master Builders' dispersing agent these bunches are broken up into individual cement particles distributed throughout the water; i.e., dispersed or deflocculated. See microphotograph at left.

This dispersion makes the cement usable to its full efficiency; all the cement surface is made available for hydration and all the water for lubrication of the mix. (Water held within the particle clumps is released.)

As a result of adding Pozzolith to cement mixes there occur the five advantages listed.

CEMENT DISPERSION SPEEDS DEFENSE— SAVES MONEY!

"Remember — by adding POZZOLITH to regular portland cement, purchased at economical prices, you get high early strength and a more rapid completion of the job. Here is economy in material cost and time."

THE MASTER BUILDERS COMPANY

CLEVELAND, OHIO — TORONTO, CANADA

MASTER BUILDERS

Precast Curb for Roads at Westover

(*Continued from page 2*)

plant batched to one of the trucks which mixed the concrete and delivered it to the yard for pouring the curb slabs.

The Gang Molds

By the use of gang molds it was possible to pour ten sections of concrete curb at one time. The individual molds were L shaped and inverted so that the curved top of the curb was cast at the bottom. The face of the forms, against the section to be exposed when the curb is set in the ground, was faced with ¼-inch plywood backed by a ¾ x 10-inch board, and a similar board was used at the upper section of the form but with no plywood. The curved face was of wood. The form was backed by seven pieces of 2 x 3's, sawed in half, as studs. The ends of the forms were 8-gage sheet metal held in place by long wedges which were driven in lightly to press the sheet metal against a shoulder cut into the 10-inch planks which made up the face of the form.

A 2 x 4 was used as a locking ranger across the outside forms and was held in place by a triangular bracket. This bracket had to be taken off every time the forms were lifted by the gantry, so they were swiveled in order that they might be turned flush against the forms when being handled by the gantry. The locking clamp for the gang mold of ten forms was a ¾-inch pipe with cast steel clamps purchased from a mail order house. The clamp at one end of the pipe was held firmly by a set screw while the other was turned up as tight as required by a small crank.

Pouring and Stripping

The ten curbs in one gang mold were poured one at a time by chuting concrete from the truck mixer directly into the mold and vibrating the low-slump concrete with a Mall electric vibrator. When all ten molds were filled, the top was roughly screeded off and the gang mold left intact for 24 hours before it was stripped.

The stripping operation was remarkably simple, considering the weight of the individual slabs, and was handled by just two men. The gang molds, having been set up on 2 x 4's before pouring, were easily accessible with a novel U-shaped carrying clamp which was swung from the electric-powered chain falls. First the locking clamps were removed and if the forms stuck together they were pried loose with a crow bar. Then, one of the short legs of the U-shaped carrying cradle was slipped beneath one form, leaving the other leg slightly above the top of the form. A small block and wedge were slipped in by hand and then the pair of U-shaped carrying clamps, one at either end of the forms, were raised by the electric hoist which swung the curb slab to a horizontal position. It then was moved across to the storage side of the yard. On that side the men swung the curb up to a vertical position so that the curved section was then at the top and the curbs were set up as closely as possible, still leaving sufficient room for the forms to be stripped by another pair of men later in the day.

Curing

Following the removal of the form from each curb they were covered with burlap and kept wet for 14 days, following which they were ready to be removed and set.

The curb sections were stored on their bases about 10 deep and were poured from the front of the yard toward the back, and then another tier was poured and stored on top of the first group. As soon as the first yard was filled with slabs being cured, the duplicate yard immediately adjacent was put into service, using the same gang molds transferred from the first yard.

Organization and Personnel

The organization responsible for the production of the 120 curbs per 8-hour day consisted of: two men setting up the molds; one man spraying the molds with oil, putting on the locking clamps and checking the molds, and after a gang mold had been poured floating off the top surface; one vibrator man; one shovel man controlling the flow from the chute of the truck mixer; two men breaking down the molds; and two other men stripping the molds from the curb sections, stacking the curbs, covering and wetting them.

The Nelson Cement Stone Co., Inc., of East Braintree, Mass., was sub-contractor for the production of the precast curb for Daniel O'Connell & Sons, Inc., of Holyoke, Mass., the contractor for the construction of the roads at the Army Air Base, Westover Field, near Chicopee Falls, Mass. Oberlin S. Clark is the owner of the Nelson Cement Stone Co., and Christopher T. Bailey, Superintendent.

C. & E. M. Photo

Pouring a gang mold of ten curb forms.

Buy Defense Bonds and Stamps.

High *in* Capacity — Light *in* Weight

BRAND NEW PUMP

New 30M MARLOW Self-Priming Centrifugal Pump; 4 cylinder, 15 hp. LeRoi air-cooled engine. Superlative performance.

MARLOW PUMPS RIDGEWOOD, NEW JERSEY

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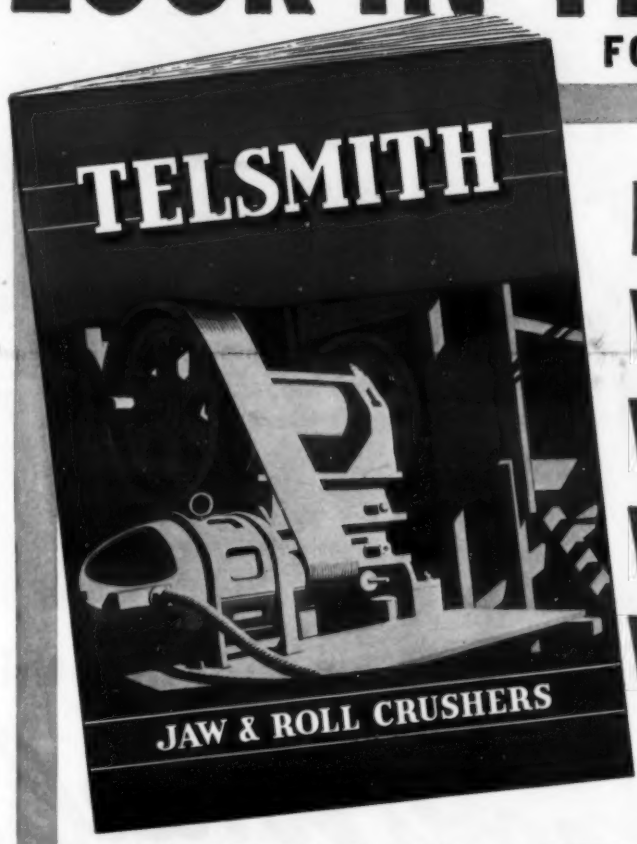

HOW you can solve your crushing problem.

WHICH size and type crusher is best for you.

WHAT is new in jaw and roll crushers.

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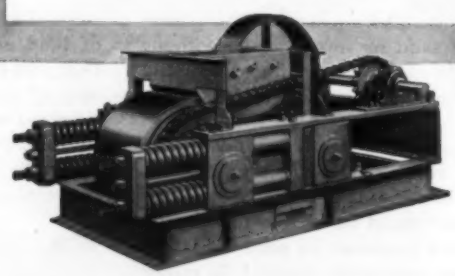
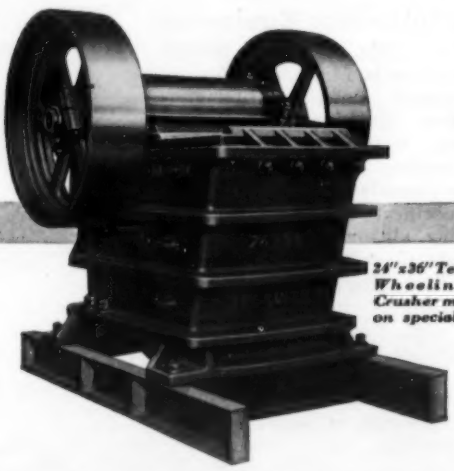
WHY you get better results with these crushers.

It's FREE... Send for it NOW





24"x36" Telsmith-Wheeling Jaw Crusher mounted on special skids.

TELSMITH DOUBLE ROLL CRUSHERS for large output of *fine aggregate* at reduction ratios not over 3:1. Less oversize than with any other type of secondary crusher. Compact structure saves headroom and weight. Anti-friction bearings and spring release give high-speed, continuous, trouble-free operation. Low first cost. *Get Bulletin JR-34.*

TELSMITH-WHEELING JAW CRUSHERS for *high speed coarse or intermediate crushing.* Give you greater reduction in one process than any other type of breaker. All steel! Force feed! Cylindrical roller bearings! You get almost double capacity, with less power, lower upkeep, longer life.

Write for Bulletin JR-34.

JR-1-C

SMITH ENGINEERING WORKS, 4016 N. HOLTON STREET, MILWAUKEE, WISCONSIN

The new Buckeye gooseneck-boom crane.

Special Crane Boom For Material Handling

To facilitate material handling, particularly when working in close confined quarters, a 1-yard crane with a short gooseneck boom has been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio. This Clipper gooseneck-boom crane is said to speed up the unloading or handling of materials, such as steel, pipe, etc., and will stack material 20 feet high or more.

All operations in the work cycle of the crane, such as swing, boom raising or lowering and load hoisting, are controlled by vacuum power which is said to provide fast smooth operation and also enables the operator to handle more work without tiring. Six small handles on a "desk-type" control board are tilted to perform various operations. The vacuum control system is designed to prevent trouble from freezing in winter and condensation of moisture in summer, making the unit an all-season machine for out-door use.

Other features of the Buckeye Clipper gooseneck-boom crane include 175-fpm minimum hoist speed; welded steel box-type boom; safety power drum brakes; minimum of 5.25 rpm full swing; quick convertibility to shovel, dragline or lifting magnet; simultaneous travel, swing and hoisting operations; four anti-friction-bearing hook rollers; 43 anti-friction bearings; power boom hoist and safety brake; flame hardened gear; and no-chain power hook-up through gears and double universal joint.

Further information on this new crane, which is available in three models, the 5-ton Model 50, the 6½-ton Model 60, and the 7-ton Model 70, may be secured direct from the manufacturer or from this magazine.

Bituminous Distributors, Maintenance Equipment

The Rosco Mfg. Co., 3128 Snelling Ave., Minneapolis, Minn., manufacturer of bituminous material distributors, road oilers, bituminous maintenance equipment, water applicators, and asphalt heating and spraying equipment, has recently issued a folder containing specification data and price lists superseding all previous lists. Illustrated data sheets for each model or item of Rosco manufacture are especially useful, according to the manufacturer.

Construction features are described in detail and clearly illustrated in this folder, copies of which may be obtained by writing direct to Rosco and mentioning this item.

"Super-Built"
JAHN TRAILERS
Available From 5 to 100 Tons Capacity
For the Correct Solution to All Heavy-Duty Trailer Problems—Come to "Trailer Headquarters."
C. R. JAHN COMPANY
1347 W. 37th Place, Chicago, Illinois

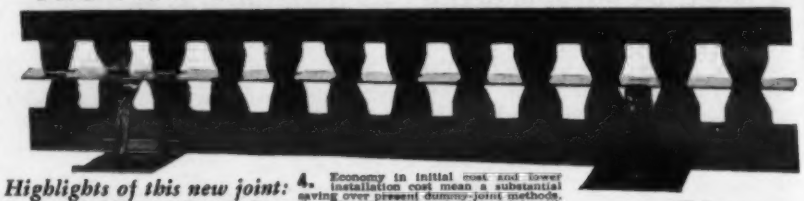
CAA Airport Program For 1942 Fiscal Year

The locations of 191 airport sites in 37 states to be surveyed for possible airport construction or improvement work under the $94,977,750 appropriation to the Civil Aeronautics Administration for the year beginning July 1, 1941, have been announced by CAA Administrator Donald H. Connolly. This appropriation falls into two major categories: a total of $33,500,000 (to be supplemented by about $42,000,000 in WPA work) is for the completion of the 250 airports on which work was begun during the current year; and the remaining $61,477,750 is to launch improvement work on the 149 additional airports which will be selected after the surveys just announced are made.

Although 191 sites will be surveyed, only 149 can be selected finally, under the law, for construction with 1942 funds. The final selections will be made by the Approval Board consisting of the Secretaries of War, Navy and Commerce on the basis of national defense importance. As in the 1941 program, Federal funds will not be spent for land or buildings, but only for improvement of actual landing areas. Local political subdivisions will be required to provide suitable publicly-owned land, to construct whatever buildings are deemed necessary and to maintain and operate the airport. Federal funds will go for grading and drainage, paving of runways, and similar work.

As in the current program, a variety of methods of construction will be employed. In some cases engineering will be handled by the Army Engineer Corps on projects let by contract; in some cases CAA engineers will provide technical services on contract jobs; while in other cases Civil Aeronautics Administration funds will be used to supplement WPA airport projects.

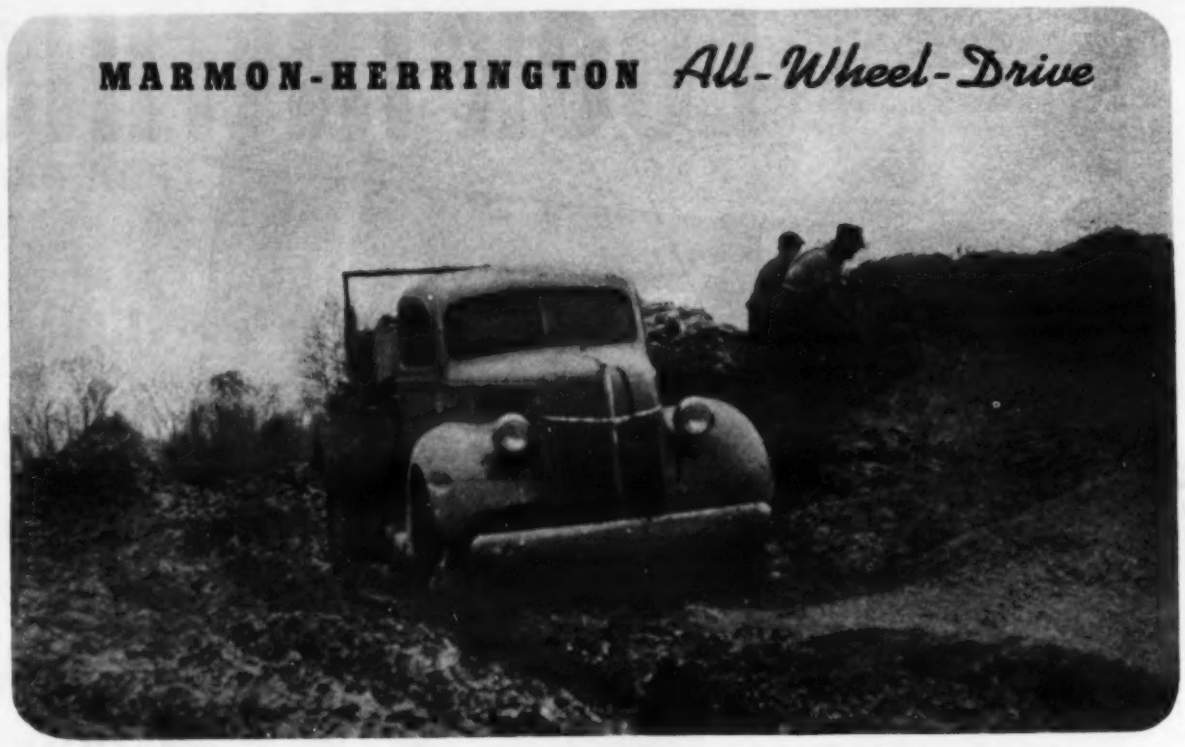
The New KEYLODE Contraction Joint—



Highlights of this new joint:
1. A rigid, fully assembled unit for transverse contraction joints, ready to be spiked to subgrade. (No dowel bars required.)
2. The heavy plate shoes with arm braces insure uniform installation alignment of dowel plate.
3. The concrete slab edges are interlocked above and below the 12-gauge key-plate to transfer heavy traffic loads.
4. Economy in initial cost and lower installation cost mean a substantial saving over present dummy-joint methods.
5. The KEYLODE contraction joint, with 12-gauge plate dowel, also acts as a seal, and with the 20-gauge dividing plate held ¾" below top of slab, eliminates the necessity of edging and filling top of joint.
6. KEYLODE contraction joints are furnished crowned or straight, as may be specified, and are shipped painted and greased. (To break bond.)

Write
HIGHWAY STEEL PRODUCTS COMPANY
Chicago Heights, Illinois

MARMON-HERRINGTON *All-Wheel-Drive*



To get out of a spot like this You Need—

Front Wheel Pull

With *All-Wheel-Drive* it is astonishing how deep the mud or sand or snow can be without stopping operations—astonishing how steep hills and grades may be without causing serious work delays.

When the going is bad, *front wheel pull* is just as important as *rear wheel push.* Working together, they get in and out of places where one without the other would be unable to operate.

On construction projects, in road building, road maintenance and snow removal, in utility service, logging and many other types of work on hundreds of jobs, Marmon-Herrington *All-Wheel-Drives* have proved their superiority over all other wheeled vehicles. They have proved their stamina, dependability and economy, as well as their exceptional performance.

For all but the heaviest hauling jobs we recommend Marmon-Herrington *All-Wheel-Drive* converted Fords. First cost and operating expense for these fleet and highly maneuverable vehicles are surprisingly low. For the most severe conditions of load and road Marmon-Herrington Heavy Duty *All-Wheel-Drives* have marked advantages over all vehicles of similar size and rating.

Let us send new issue Marmon-Herrington *Pictorial News*—showing these vehicles *in action.* No obligation. Cable address MARTON, Indianapolis, Indiana, U. S. A.

MARMON-HERRINGTON CO., INC. • INDIANAPOLIS, INDIANA, U. S. A.

South American Section Of Pan American Highway

Of the 8,097 Miles in South America of Route Linking the Americas 76 Per Cent Now Passable

(*Photo on page 48*)

✦ DURING the past two decades, Latin America has made considerable progress in modern highway development. The first great interest in more adequate roads was occasioned by the series of conventions and meetings of delegates from the southern republics with United States highway engineers and associations interested in highway progress throughout the world, from which developed the Pan American Highway Project (C. & E. M., May, 1941, page 10).

According to a report of the Public Roads Administration, about three-fourths of the South American section of the proposed Pan American Highway is now passable during all seasons of the year. The 8,097 miles of highway in the South American section, between the Colombia-Panama border and Buenos Aires, Argentina, including alternate routes, has 2,015 miles or 25 per cent paved; 4,147 miles or 51 per cent of all-weather surfaces; 1,646 miles or 20 per cent, dry-weather surfaces; and 289 miles or 4 per cent are trails.

The principal route of those first proposed extends from the Atrato River in the northwest corner of Colombia down the west coast of the continent to Valparaiso, Chile, then east to Santiago and thence over the Andes by the Uspallata Pass, where stands the world-famous Christ of the Andes statue, and then across the Argentine pampas to Buenos Aires. This route is 5,757 miles long. The alternate route to Buenos Aires leaves the west coast route at Vitor, Peru, crosses the Andes by way of Lake Titicaca to La Paz, Bolivia, and proceeds south and east to Buenos Aires by way of Cordoba. This route is 5,433 miles, of which 3,093 miles is the distance from the Colombia-Panama border to Vitor, Peru, and the remaining 2,340 miles the length of the route from Vitor to Buenos Aires.

Outstanding improved sections are along the coast of Peru and between Cordoba and Buenos Aires in Argentina. The section in Peru is 763 miles long and has a bituminous surface with excellent alignment and grades, extending from Chiclayo south through Lima, the capital, to Nasca. The section in Argentina is paved with concrete and bituminous mixes from Buenos Aires to a point 30 miles north of Cordoba, a distance of about 500 miles.

Meeting Points

Points where the highway will cross international boundaries have been generally determined in all cases. Wherever construction has progressed to the frontier there has of course been a definite agreement between the respective countries as to the point of crossing. Common frontier points have been established between Colombia and Ecuador, the line between Argentina and Chile by way of Mendoza and Los Andes has been determined, also that between Peru and Bolivia near the shores of Lake Titicaca, and between Ecuador and Peru. Further improvement of the road in southern Peru will lead to establishment of a definite crossing point at the Chilean frontier. The common point between Bolivia and Argentina has been shifted once or twice but has now been established at Fortin Campero. This subject of meeting points is on the agenda of the Fourth Pan American Highway Congress to be held at the Fine Arts Palace in Mexico City September 15 to 24, 1941.

Public Roads Administration Photo

A modern highway near Rio de Janeiro, Brazil, typical of much of the terrain through which the Pan American Highway will pass.

Other Routes

Other routes comprising a part of

(*Continued on page 42*)

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

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"There's More WORTH in a Worthington"

There is a Worthington Distributor or Branch Office in your area that will give you prompt local service.

Reel Evidence that is Real—coming from an ever-growing number of Construction and Quarry men throughout the country. They are speeding operations and saving money with Worthington Construction Equipment—Rock Drills and Air Tools that use LESS AIR—Portable Compressors that deliver MORE AIR.

"There's More WORTH in a Worthington" for you, too.

These are the Features that put "More WORTH in a Worthington."

ROCK DRILLS AND AIR TOOLS

DESIGN: Skilled, scientific designing results in low air consumption, high rate of penetration—and a tool that is easy on the operator.

QUALITY: Forged steel throughout, precision-made parts, and highest skilled workmanship guarantee ruggedness, long life and low maintenance.

SPECIAL FEATURES: In certain Drifters and Hand-Held Drills such exclusive Features as Independent Rotation, Pneumatic Feed and Hole Spotters result in lower cost per foot of rock drilled.

PORTABLE AND SEMI-PORTABLE COMPRESSORS

Worthington Compressors are designed for HEAVY-DUTY, MODERATE SPEED service resulting in maximum overall performance with long life and low maintenance cost. These benefits result from—

- TWO STAGE AIR COOLING
- FEATHER VALVE
- ARTICULATED CONNECTING ROD
- FORCE FEED LUBRICATION
- ENCLOSED CLUTCH
- SEALED CRANK CASE
- UNIT ASSEMBLY
- SIX-CYLINDER ENGINE
- SECTIONALIZED RADIATOR AND INTERCOOLER
- STRUCTURAL STEEL ALL-WELDED FRAME
- ROLLER BEARING WHEELS

WORTHINGTON

Address Inquiries to
HOLYOKE COMPRESSOR AND AIR TOOL DEPARTMENT
HOLYOKE, MASSACHUSETTS

PCI-4

Unusual Forms Used At Mahoning Dam, Pa.

(*Continued from page 2*)

lower level. The segregation of the mixed concrete as it is discharged from the conveyor belt into the two lower discharge hoppers was practically eliminated by baffling the two hoppers so that the concrete is completely turned over in flowing through the hopper to the buckets.

Hauling and Placing Concrete

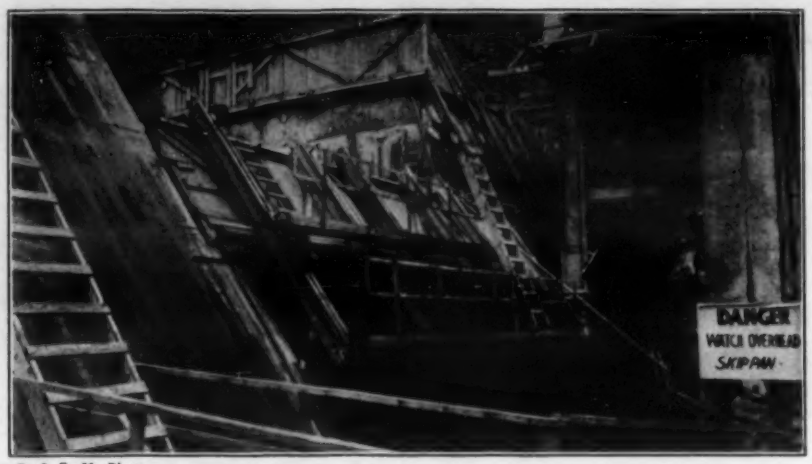
On each level, both high and low, a Porter gas locomotive with one flat car hauls the buckets. The flat car is equipped with steel plate guides for spotting the 2-yard Dravo concrete buckets which have recessed control wheels. The flat car carries two full buckets and there is a third space which is left vacant for the first empty bucket returned by the cranes out on the dam. The delivery of the concrete from the hopper to the buckets is pneumatically controlled. The bucket hooker has two stands built between the buckets from which he operates the delivery chute. For normal work two trains of two buckets each are run continuously during a pour. The trains are passed at each level on the trestle by a single run-around track with two automatic spring switches.

Two gantry cranes of 24-foot gage and with 85-foot booms run on the upper or high-level trestle, and two stationary revolving cranes on short tracks are used at the two ends of the dam on a slightly higher elevation to handle the concrete for the abutments. As the concrete is delivered to the forms a six-man crew assists in placing it. There are two shovel men and two 2-man Chicago Pneumatic electric vibrators operating at a frequency of 7,200.

Cantilever Forms

Two types of forms are used by Dravo on the lifts for the dam. The cantilever forms of Dravo design are of particular interest. They consist of solid vertical 4 x 8-inch sheeting with a 4 x 6 at the top and bottom, reinforced with channels and diagonal 4 x 6's.

In erecting these forms, double 10-inch channels back to back with 3-inch pipe spacers act as vertical wales, shown in the illustration, and are tied securely



C. & E. M. Photo

A panel of cantilever forms on the face of Mahoning Dam.

to the face of the concrete of the lift below by a tie bolt with a female thread which can be backed out of the face of the concrete. These vertical wales cantilever one complete lift below the lift being poured. The lower tie bolt acts as an adjustment to give the proper slope to the form in line with the face of the dam.

At the top of these forms, at the end of each of the six vertical wales, is a hook which rests in a small steel pot set in the top of the concrete after the lift has been poured. This is a safety device so that when the forms are loosened these hooks will hold them in position and prevent them from sliding down the face of the dam. The vertical wales also carry two scaffolds, as illustrated, from which the men setting and adjusting the 10-foot panels can operate. Four 10-foot panels are used to make one form for a 5-foot lift.

On the under side, or the bottom, of each 40-foot form is a 1½-inch perforated pipe which is connected up at the panel joints with a rubber hose to the water system and is used to keep the face of the dam wet for curing for a period of 14 days after the lift has been poured.

In moving the forms, one panel is moved at a time, using an A frame and a chain hoist instead of tying up the gantry to handle the huge 40-foot form.

Quantities and Other Data

The Mahoning flood-control dam is of

(*Concluded on next page*)

MARVEL

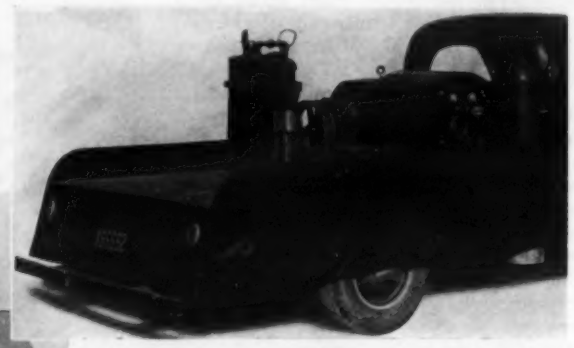
CONCRETE VIBRATORS

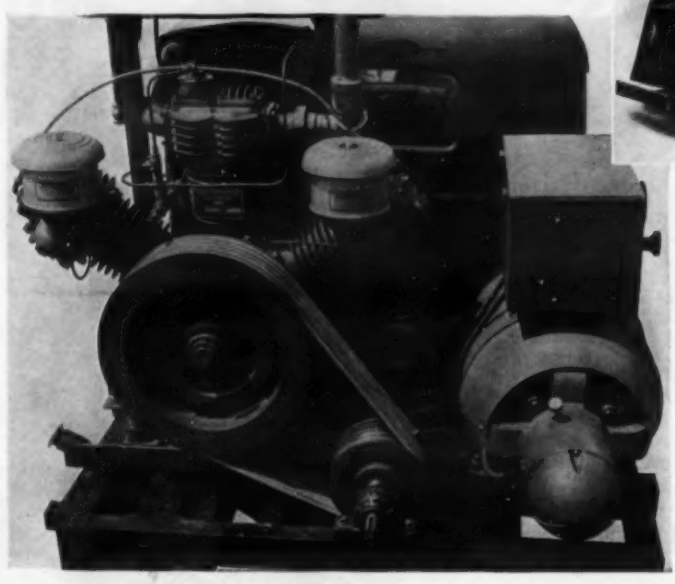
Gas or Electric

Helper wheel is standard equipment on all models. Write for literature and prices.

Marvel Equipment Manufacturers, Inc.
224 So. Michigan Ave. Chicago, Ill.

USE ALL THE POWER OF THE TRUCK MOTOR





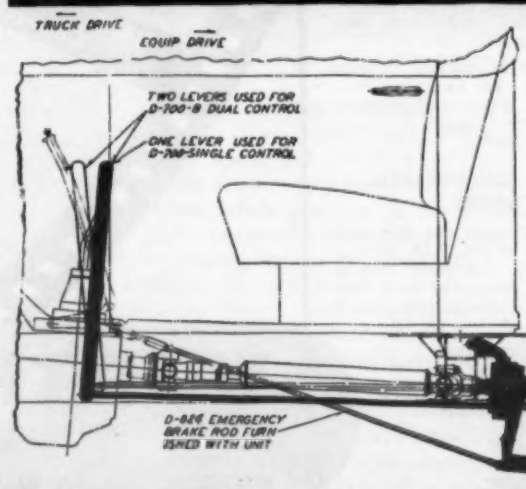
NO EXTRA MOTOR REQUIRED

for operation of truck mounted equipment such as air compressors, welders, winches, pumps, rock crushers, cement mixers, etc. The full horse power and torque of the truck motor is transmitted through a Hercules Split Shaft Power Take-off to the equipment being operated. Units require no special attention after installation, and become a regular part of the truck chassis.

Direct, dual, and side drive types are available for operation of almost every type of truck mounted equipment. Dual drive units permit simultaneous power transmission to both rear wheels and equipment. Either truck or equipment may also be operated independently.

Hercules Split Shaft Power Take-offs are fool-proof in operation and design. When Take-off jaw clutch is in neutral, truck drive, or Power Take-off drive position the clutch is locked and cannot engage or disengage. Hercules units are stronger than the original truck parts which they replace.

HERCULES POWER TAKE OFF


TRUCK DRIVE
EQUIP DRIVE
TWO LEVERS USED FOR D-700-B DUAL CONTROL
ONE LEVER USED FOR D-700-SINGLE CONTROL
D-926 EMERGENCY BRAKE ROD FURNISHED WITH UNIT

Take-offs are installed in a portion of the truck drive shaft, with driving sleeve on the take-off drive shaft. Pulley or sprocket is attached to sleeve from 1½" to 6" behind truck cab. V-belt or chain drive to equipment.

SPLIT-SHAFT

Model D-700 Direct Drive unit illustrated. Both medium and heavy duty models available.

Hercules Power Take-offs may be ordered as standard equipment from many portable equipment and truck manufacturers. Bare unit prices from $200.00 to $350.00 depending on type of unit required.

HERCULES STEEL PRODUCTS CO. GALION, OHIO

Safety Measures on Flood-Control Dam

(Continued from preceding page)

the concrete-gravity type 993 feet long at the top. The spillway section is 192 feet long, with a gated length of 150 feet, and the stilling weir below the dam is 464 feet long at the top and rises 34 feet above stream bed. The overflow section is 180 feet in length. The drainage area above the dam is 341 square miles which receives an average annual precipitation of about 40 inches.

The top elevation of the masonry spillway is 1,135 while the top elevation of the abutment is 1,170. The high-level construction trestle is at Elev. 1,100 and the low-level trestle 1,040. The lowest rock in the excavation for the dam was at Elev. 962 while the highest concrete placed is at Elev. 1,191 in the pylon building. Operations at the dam consist of three 8-hour shifts working 6 a.m. to 2 p.m., 2 p.m. to 10 p.m., and 10 p.m. to 6 a.m.

The estimated quantities in the dam and its auxiliaries on which the contract was based are as follows:

Common excavation	90,000	cubic yards
Rock excavation	170,000	" "
Line drilling	36,000	square feet
Rock treatment, one coat of grout	40,000	" "
Compacted backfill	40,000	cubic yards
Random fill	18,000	" "
Drilling 2-inch grout holes, percussion and core	9,000	linear feet
Drilling 3-inch holes in rock	4,000	" "
Cement	305,000	barrels
Cement for pressure grouting	18,000	sacks
Concrete, main dam	308,400	cubic yards
Concrete, stilling weir	9,600	" "
Reinforcing steel	1,000,000	pounds
Structural steel	215,000	"
Iron and steel pipe	196,200	"
Iron castings	91,800	"
Miscellaneous metal work	68,000	"
Miscellaneous brass and bronze	6,400	"
Gantry crane rail	46,000	"
Copper and steel water stops	100,000	"
Crest gates, slide gates, valve and operating machinery	840,000	"

Safety Measures

The accident rate at Mahoning Dam has been maintained at a reasonably low figure through the educational work of the supervising authorities, the use of numerous warning signs, and particular care in the construction of stairways and walkways for the workers. The stairways were all equipped with expanded metal nailed to the treads to prevent slipping in icy weather or when the treads became covered with wet clay from the workers' shoes. One potential hazard, namely a change in the height of risers on one of the stairways, a thing which should never occur on a construction project, was taken care of by a warning sign "Caution—Change of Risers". The walkway along both the high and low-level trestles was separated from the track way by wood treads of 2 x 8's set on edge and securely built into the decking.

Personnel

The Mahoning Creek Dam is being built by the Construction Division, Dravo Corp. of Pittsburgh, Pa., J. S. Miller, Senior Vice President, under the direction of D. P. "Dave" Childress, Superintendent. The contract was awarded by the Pittsburgh Office, U. S. Engineer Department, Lt. Col. L. D. Worsham, District Engineer, with J. I. Bowman as Resident Engineer on Construction.

Vibration-Proof Nuts

When applied to a bolt, an Elastic Stop Nut acts in every way as any other nut, until its locking collar reaches the end of the bolt. Then the nut is forced outward, its outer thread flanks being brought into pressure-contact with the inner thread flanks of the bolt. Immediately and automatically, according to the Elastic Stop Nut Corp., 2333 Vauxhall Road, Union, N. J., all thread play is eliminated, and friction is established between the threads of the nut and bolt throughout their entire length. It is this friction which prevents the nut from working loose.

A new catalog recently issued by this company describes and illustrates the features of Elastic Stop Nuts and their many applications. Copies may be obtained direct from the manufacturer.

SCHINCK TRACTOR LOADER

A mechanical loader to be used on most row-crop type tractors.

——Used for loading——

Sand, gravel, dirt, snow

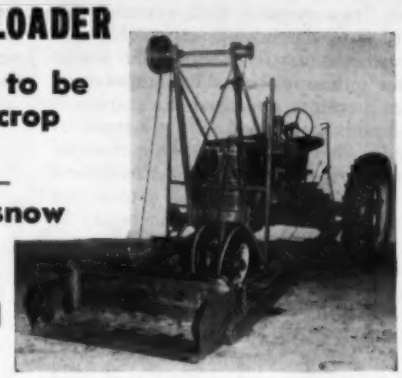
Immediate Delivery

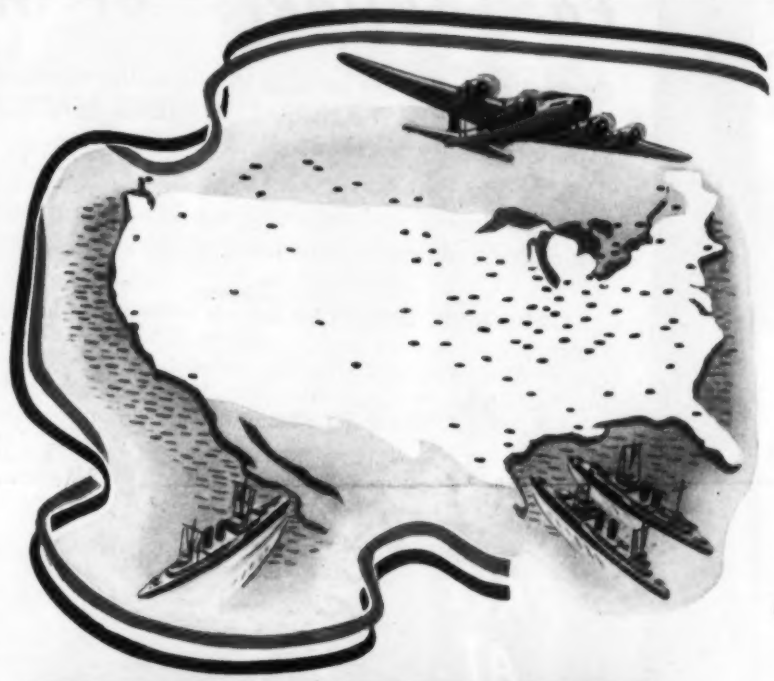
Write for literature.

J. A. SCHINCK & SON

Manufacturers

MEADOW GROVE, NEBRASKA





TRACTOR SERVICE "BASES"

Coast to Coast

Like the NAVY, ARMY, and AIR FORCE, TRACTORS Need Bases Too

Tractors need "bases," whether they are working for Uncle Sam or for you.

Convenient "bases," with modern service facilities, have long been part of an established after-sale service policy with International Harvester. This complete line of International Industrial Power (TracTracTors, Wheel Tractors, Power Units) is backed by a vast network of Company-owned branches in the United States and Canada. These branches, in connection with scores of authorized industrial dealers, provide fast, thorough service to owners and operators of International Industrial Power in all parts of the country.

Ask the nearest International Industrial Power dealer or Company-owned branch about the International Industrial Power line. Write for information —no obligation.

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MUST BE PROPERLY REINFORCED

Design Data and Complete Steel Service

Write for this Bulletin and Direct Your Inquiries to

LACLEDE STEEL COMPANY

ST. LOUIS, MO.

All Groups Must Join In Securing Publicity

(*Continued from page 7*)

contractors have never advertised or sought the good will of the public because laws require that contracts be awarded to the lowest responsible bidder, which usually means the lowest bidder unless he has a bad reputation. It has therefore appeared to contractors that building up good will is a waste of money. That situation is being changed because of the increasing encroachment of the government on the contracting business. It now becomes necessary to convince the public that the contract method is the best method, or else individual contractors will not have jobs on which to bid.

"In order to secure the good will of the public, it becomes necessary first to convince contractors that the good will of the public is absolutely essential to the contracting business and, secondly, to persuade contractors to advertise as an industry and not only as individual firms. It appears that the hardest thing to do in order to undertake a public relations program for the benefit of contractors is to convince contractors that such a program is necessary.

"The principal features of the contracting business which must be brought to the attention of the public in order to have its good will may be stated as follows:

"1. The efficiency of the contract system must be the main talking point.

"2. Competition between bidders means that only the more efficient contractors remain in business and therefore perform public work.

"3. The advantage to the public of having the contractors' work inspected by an engineer who represents the public is the best possible guarantee of proper work. On work performed by government agencies the inspector represents the same interest as the one performing the work, and such inspection is not effective.

"4. Engineers and public officials must be persuaded that they can not save the contractor's profit by doing the work themselves.

"5. The public must be told that under the contract system the contractor guarantees, with a good and sufficient bond, the quality of the work, the time in which it will be completed, and the final cost to the public.

"Publicity men certainly know better than do contractors how to gain the good will of the public. It may be assumed, however, that such a campaign should include advertising, by the industry, through contractors' associations, in local and national publications; human interest stories in the daily papers regarding difficulties and incidents on particular jobs; speeches by members of the industry before chambers of commerce, luncheon clubs, and to student groups; advertising the contract system by billboards on all contract jobs; cordial relations between individual contractors and local merchants and citizens."

Cultivate the Public

Also stressing this idea of cultivating the public, George C. McNutt, Advertising Manager for R. G. LeTourneau, Inc., manufacturer of contractors' equipment, suggests that contractors have too long neglected public relations and, like many who go ahead and do a job without crowing, have acquired the reputation of holding a "public be damned" attitude, of being hard-boiled.

"Public relations can begin on the job. If it's a highway project, add to the detour sign some information on the purpose of the project, how much time the new route will save, its safety features, and that it is being built by contract. See too that the local newspapers get this information. Invite the local editors out to the job and have some one, preferably the project engineer or the contractor himself, take them around. Show them how modern equipment makes improvements possible at lower costs to the taxpayers. Give them statistics on employees, local supplies consumed, etc. If the job is finished ahead of schedule, be sure they get the news with comparative figures so that they can talk 'new records on local job'. Give the reporters the names of local men connected with the project, sponsors, highway officials, district engineers, etc. Put the emphasis on the benefits to the public.

"Don't overlook luncheon clubs. Members of Rotary, Kiwanis, Lions, etc., usually are important persons locally. Invite them to visit the job. Work out a short tour, with a guide or two, for them. If a good speaker, corral a luncheon club program occasionally. You can get in plenty of plugs for the contractor system on such programs, and normally the local papers will carry a brief of the talk as part of their routine coverage of luncheon club doings.

"Remember, the more the public knows about the benefits of a contractor's work to the public, the better off contractors will be. So cultivate the public."

Manufacturers Can Help

"The public in general will agree that a ship without a rudder is little better than no ship at all, but it is less likely

(*Continued on page 36*)

Mighty Good News

For Builders of Airports and

Contractors will now be able to utilize the maximum production of their biggest paver the MODEL XB BLAW-KNOX FINISHING MACHINE it is now possible to pave at top superior quality finish of slab.

This new model finishing machine has greater flexibility of design and operation to handle slump concrete and better meet variable field conditions.

GOOD NEWS INDEED for defense contractors who must pave in a hurry. New Blaw-Knox Finishing Machines Concrete Spreaders are hard at work on various defense projects, a few of which are: the Boise (Idaho) Airport (Utah); Gunter Field (Ala.); Jefferson Proving Ground (Ind.); Glenn L. Martin Aircraft Plant (Md.); Wendover Air (Alaska); Sunset Airport (Wash.); Trans-Isthmian Highway (Panama); Kingsbury Ordnance Plant (Ind.); Vultee Aircraft (Tenn.); Naval Air Base (Fla.); Mobile (Ala.) Airport; Hamilton Field (Cal.) Airport; Scott Field, (Ill.)

PAVE AT TOP SPEED

Paving contractors like BLAW-KNOX AUTOMATIC TRANSVERSE BLADE CONCRETE SPREADERS. That's why four times as many Blaw-Knox Spreaders have been sold as other makes combined, since the introduced and put into service early in the year.

SPREAD CONCRETE MECHANICALLY:—Blaw-Knox CONCRETE SPREADERS, equipped with an automatic transverse spreading blade, easily handle the top output of any paver . . . will spread concrete without segregation . . . will spread concrete as dry as ½ inch slump . . . will spread concrete with disturbing road form alignment . .

Dump concrete anywhere on the subgrade in front of the spreader . . . does the rest — the spreading blade action is automatic.

Blaw-Knox Concrete Spreaders can be changed from narrow width (single lane) to full width or vice versa by the addition or removal of changeable parts. This cannot be done with any other concrete spreader.

BLAW-KNOX

Brand Your Equipment

A cause of irritation on any construction operation involving more than one contractor frequently is the loss of small tools and pieces of equipment, due to a contractor's inability to identify beyond question his own material. In the aggregate this relatively small leak may represent a substantial loss. The Everhot Mfg. Co., Maywood, Ill., manufactures an inexpensive, efficient and simple branding iron that can be used whenever and wherever the necessity for branding occurs, on tools, sheeting, scaffolding plank, ladders, wheelbarrows, etc.

Complete information, including prices, is contained in an illustrated catalog recently issued by this company. Copies may be obtained by writing direct to the manufacturer.

Truck-Patrols in Action

Bulletin No. 441 issued by the Willett Mfg. Co., Grand Rapids, Mich., describes the Willett hydraulic under-body maintainer blade, known as the Hydraulic Truck-Patrol, and contains many illustrations of this unit in action, in both summer and winter. This power-reversing power-tilting power-rotating blade is claimed to grade and maintain gravel roads in a smooth even plane, with cushioning of the blade, and also easily cuts sod, shapes up shoulders, grades material in or out from the edge of the road, and cuts ice ruts and hard-packed snow from the highway during the winter.

Copies of this bulletin may be secured by interested state, county and town highway engineers direct from the manufacturer by referring to this item.

New Marion Distributor

The Marion Steam Shovel Co., Marion, Ohio, announced recently the appointment of Walling Tractor & Equipment Corp., Portland, Ore., as its distributor for Marion shovels, draglines, clamshells, cranes and pull-shovels up to 2½ yards capacity in the entire state of Oregon and seven counties in southwestern Washington.

...THE NEW MODEL Blaw-Knox FINISHING MACHINE

MODEL XB . . . gas driven
Up to 4-foot Width Adjustment available

HAS EXCLUSIVE FEATURES

- FOUR working traction speeds, and TWO travel speeds—SIX speeds forward and reverse.
- FOUR screed speeds.
- UNIT AUTOMOTIVE TRANSMISSION drives traction, screeds belter, and tamper or vibrator.
- SPECIAL WHEEL EQUIPMENT for multiple lane construction of airport runways and aprons.
- REMOVABLE WHEEL RIMS for quick wheel change.
- STRONGEST structural frame of any finishing machine ever built. One piece cross members—no splices. Design provides better weight distribution with elimination of 1000 lbs. excess weight—easier on the forms.
- WIDEST screed ends—keeps concrete between forms.
- FOOT PEDAL STEERING and braking.

5 YEAR GUARANTEE ON STRUCTURAL FRAME AND WHEEL AXLES

Other features of the new MODEL XB BLAW-KNOX FINISHING MACHINE include:

—Self-aligning ball bearings for screed drive.
—Accurate quick adjustable front screed for rapid crown change.
—Fast power operated hydraulic screed lift.
—Efficient wheel cleaners.
—Quick and convenient transportation wheels.

BLAW-KNOX DIVISION of Blaw-Knox Co.
Farmers Bank Building Pittsburgh, Pa.
New York Chicago Philadelphia Birmingham
Representatives in Principal Cities

Grading 2 Miles Up On Wyoming Highway

Regrading and Relocation of U. S. Highway 287 to Provide Tourist Route to Yellowstone Park

✦ TWO miles up in the clouds of northwestern Wyoming, 120 miles from the nearest railroad siding, and 30 miles from the nearest town, a community boasting less than 200 inhabitants, the Barnard Curtiss Co., contractor, of Minneapolis, Minn., last summer pushed its dirt-moving equipment in daily double shifts during the short construction season to complete the regrading and relocation of 4.6 miles of mountainside road on U. S. Route 287. This route turns and twists over Togwotee Pass in the Wind River Range of the Rocky Mountains to the southeastern entrance to Yellowstone National Park.

Moose and elk ambling over the grade, curious bears poking around the camp, and the howling of wild animals in the thin night air were only a few of the unusual features of this job, the contract price for which was $100,000, or over $20,000 a mile. Togwotee Pass on the Continental Divide pierces the clouds at an elevation of 9,658 feet. here U. S. 287, known as the Wind River Highway, climbs a tortuous trail from Dubois over the snow-capped Rockies to dip down into the Jackson Hole country, spreading from the foot of the Wind River Range in a vast expanse of fertile grazing and forest land to the Grand Teton range 50 miles away.

To open up this virgin land to the tourist, the Wyoming State Highway Department and Public Roads Administration have embarked on a long-range reconstruction program on U. S. 287 from Riverton and Lander, Wyo., to the Snake River or south entrance to Yellowstone National Park. The contract for regrading and relocating 4.6 miles of the old road in the Togwotee Pass area was awarded to Barnard Curtiss Co. in October, 1939. Late in that month, the contractor engaged local labor and erected a camp in the isolated mountain region. It was too late to move in the heavy equipment from the railroad siding 120 miles away, but before the Pass was snowed under hand labor had completed 20 acres of mountainside clearing and the site was ready for the spring "Go-Ahead" signal.

In this section of the country, the working season is short, sometimes only three months and never more than four. On June 10, 1940, the start of construction activities was authorized, but previous to that the contractor had moved his equipment up the mountain side from Riverton and was ready to begin moving dirt.

Grading Operations

The grading on this job was heavy, with 200,000 cubic yards of unclassified excavation, 40,000 cubic yards of borrow pit excavation, 436,000 station-yards and 30,000 cubic yard-miles of overhaul. Except where borrow was used, the cuts and fills were balanced. Fills ran from a maximum of 1,500 feet to 1,800 feet in length, with most of the cuts sidehill and not more than 15 feet deep. The roadway width is 30 feet.

When work started on June 10, two Caterpillar RD7's with bulldozers went into action and soon disposed of the grubbing. The Superintendents for the contractor, R. W. and Neil G. Barnard, had carefully looked over the job and decided upon the use of scrapers for most of the dirt moving. Three LeTourneau 12-yard Carryalls hauled by RD8's were used to strip the top soil and in cuts throughout the job, except where excessively tough material was encountered. On these sections, a P & H 1½-yard gas shovel loading to three Koehring Dumptors was called into service.

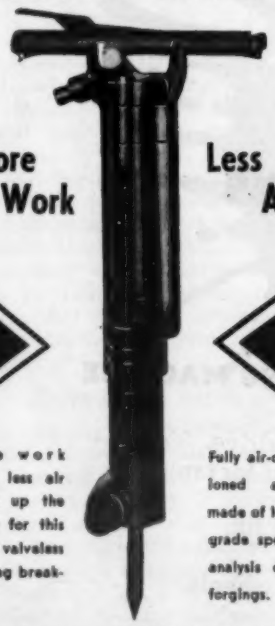
Fill was hauled in scraper or Dumptor loads, spread in 8-inch layers, and compacted by two double sheepsfoot rollers pulled by RD7's. The weather in Wyoming's mountains is difficult and unpredictable. Scarcely a day, even in midsummer, passes without a sudden mountain shower. Along many sections of the Wind River Highway the moisture content of the soil is 25 per cent, making the dirt difficult to move and almost impossible to compact. The required compaction was 95 per cent, but in soils with such a high moisture content even continuous sheepsfoot operations would not meet the requirements and it was often necessary to spread out long sections of fill to dry before the required compaction could be reached.

In spite of the poor soil conditions, the weather, and the necessity to maintain traffic over the job, Barnard Curtiss achieved the respectable average of from 60 to 70 yards of dirt an hour and, by stretching their construction season into October, shaped and finished the grade last autumn.

In addition to the equipment already mentioned, the contractor also had an Allis-Chalmers 35 tractor, an Austin-Western ripper, and two 12-foot blade

(*Concluded on page* 39)

HARDSOCG



More Work — Less Air

More work with less air sums up the story for this C-86 valveless paving breaker.

Fully air-cushioned and made of high-grade special analysis drop forgings.

Write us for complete specifications and other details.

HARDSOCG DRILL CO.
227 South Benton St.
OTTUMWA, IOWA

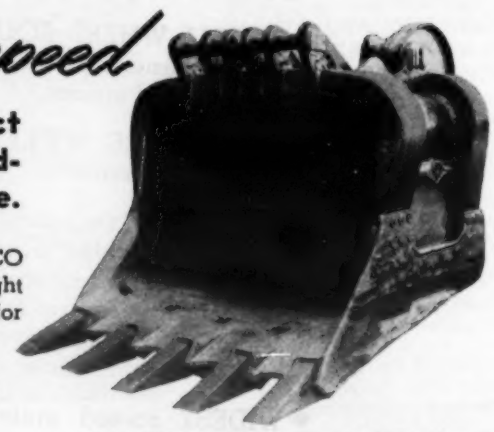
KOEHRING uses PMCO WELDED DIPPERS

Koehring No. 801 working in Norfolk and Western Yards at Roanoke, Va.

Heavy work at high speed

—the result of correct engineering in shovel and dipper—the product of years of manufacturing experience.

PETTIBONE MULLIKEN engineers have built into PMCO welded dipper an increased capacity in relation to weight that has established a new standard of efficiency for power shovels.



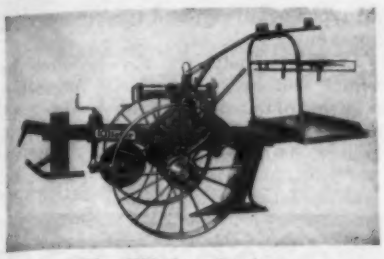
2-yd. PMCO welded dipper, Koehring design. The modern weight saving dipper for the modern weight saving shovel.

Some Representative Users of PMCO speed dippers:

Koehring
Thew-Lorain
Butler Brothers
Link-Belt Speeder
Harnischfeger Corp.
The M. A. Hanna Co.
Oliver Iron Mining Co.
Pickands, Mather & Co.
Lima Locomotive Works
Ayreshire Patoka Collieries
Manitowoc Engineering Works

We operate the largest and most complete manganese steel foundry in the United States

PETTIBONE MULLIKEN CORPORATION
Established 1880
4710 West Division Street, Chicago, Illinois



The Killefer wire layer.

Wire-Laying Machine For Use at Airports

The large amount of airport construction required by the National Defense Program involves, among other things, the laying of a large amount of wire and cable for electric lighting and telephone lines which must be laid underground.

The Killefer 201D wire-laying machine, especially designed for this purpose, is equipped with a power-lift device and, it is stated, will bury one or two pairs of rubber-covered conductors for underground service connections at any desired depth down to 20 inches, without the necessity of trenching or backfilling. Lifting and lowering are controlled by rope from the tractor or truck used for power while depth is accurately adjusted by a crank. The digging point is adjustable for wear, and the front edge of the standard is protected by a reversible shin. A rolling coulter 16 inches in diameter is provided for sod opening and is adjustable vertically by a crank. The runner-type depth gage is also adjustable vertically. The reels of cable are placed on the reel deck at the rear of the machine and do not revolve. They are centered and locked on the deck by a swinging reel guide. The conductors or cables are protected from chafing, catching or snubbing on the rough edges of the reel by a metal guide which drops down over the reel deck. The conductors feed freely from the reels through sheaves which guide them to the tube mounted behind the standard. The hitch is adjustable vertically.

Further information on the Killefer wire-layer 201D, or on the Model 200W which is similar in construction and operation, may be secured by those interested direct from the Killefer Mfg. Corp., Los Angeles, Calif.

Used-Machinery Dealer Opens New York Office

Because of the tremendous amount of equipment required for defense construction, the Equipment Corp. of America, Chicago, Ill., has found the demand for rebuilt construction equipment so great that it has opened a New York Office in the Hudson Terminal Building, to supplement those in Pittsburgh and Philadelphia in serving the eastern seaboard. This company, formerly a manufacturer of concrete mixers and similar equipment, gave up its manufacturing business in 1928 and concentrated on the purchase, rebuilding and sale or rental of used construction equipment.

John A. Comboy, formerly Assistant to M. E. Jost, General Eastern Sales Manager in the Philadelphia office, will be in charge of all the New York Office's activities.

"Tool of a Thousand Uses" Described in New Bulletin

Bulletin P&P-41, just issued by Templeton, Kenly & Co., 1020 So. Central Ave., Chicago, Ill., contains up-to-date application data that has been gathered on the Util-A-Tool. This handy tool consists of nine pieces of equipment used in various combinations to perform various jobs. How the tool pulls in, pushes apart, clamps, tensions, bends conduit, beams, etc., straightens bent axles, etc., pulls wheels, gears and pulleys, and easily performs other laborious and time-consuming jobs is shown in illustrations. Specifications and prices are also given.

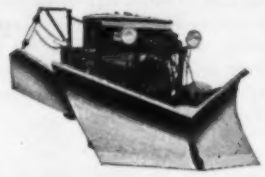
Copies of this bulletin may be obtained by writing direct to the manufacturer and mentioning this item.

New Edition of Heil News

A fifth edition of the Heil Quality News, devoted exclusively to the types of road machinery manufactured by the Heil Co., Milwaukee, Wis., has recently been added to the list of publications of that company. The road machinery edition is published periodically and is devoted to a pictorial presentation of the various models manufactured and the type of work they are being called upon to perform in the field.

The road-machinery edition of the News is designed to help dealers and salesmen demonstrate with actual photographs the kind and quality of work which Heil machinery will do and to acquaint the field with the newest developments in the Heil line. Interested contractors and state and county highway engineers who would like to receive copies of this news-bulletin regularly may do so by sending their requests direct to the Heil Co., mentioning that they are readers of CONTRACTORS AND ENGINEERS MONTHLY.

DEFEND the HOME FOLK – EARLY and WELL



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BUY NOW Right now is the time to place your snow plow orders for next winter. We can make satisfactory deliveries on a considerable volume of Davenport-Frink Sno-Plows—providing the orders reach us soon. These finer plows insure EASIER, FASTER and CLEANER snow removal. ACT NOW.

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Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK.

LOOK into SMITH-MOBILE

INSPECT the ENTIRE batch before any of the concrete is discharged.

✓ Check these SMITH-MOBILE FEATURES

1 HIGH DISCHARGE — 27" to 34" higher than old-style truck mixers. No hoist or ramp required.
2 CONTROLLED DISCHARGE — pour it fast or slow. The concrete comes out in a smooth steady flow and without segregation.
3 VISIBLE MIXING — Open the door and look into drum while drum is revolving. Watch the mix, SEE what's going on inside.
4 FEED CHUTE CHARGING — Loaded on the level, no ramp needed. Easy to spot under bin.
5 DRUM REVOLVES WHILE CHARGING—Shrinking and mixing start instantly. Carries larger loads.
6 NO LOADING HATCHES to open or close. Driver can stay right in cab.
7 NO LEAKY TROUBLESOME DISCHARGE DOOR — Closing door on Smith-Mobile can be kept open during mixing cycle.
8 WATER INTRODUCED THROUGH CHARGING OPENING—for transit mixing, water nozzle located in top part of drum, well above concrete. High pressure pump furnished as regular equipment.
9 STEEP DISTRIBUTING CHUTE FOR DRY CONCRETE — Will spout dry concrete directly into high forms, buckets, concrete carts, etc., without pushing it down the chute.
10 LARGER RADIUS OF SPOUT DISTRIBUTION—Use the spout for pouring directly into forms instead of using carts or wheelbarrows.
11 BETTER AND FASTER MIXING — Scientifically designed T-shaped spiral blades provide a fast end-to-end movement of the aggregates.

REAL VISIBLE MIXING

...an Exclusive Smith-Mobile Feature

Enables the contractor, inspector or foreman to control the batch, make sure that the concrete is just the way he wants it—not too wet, not too dry, etc. At any stage of the mixing cycle (even with a full load), the door can be opened wide, and no concrete will come out until the drum is reversed. You can look right into the drum and actually SEE what's going on inside. Remember, Smith-Mobile is the ONLY truck-mixer that gives you this important feature. So, be sure to look into the PROFIT possibilities of this modern, high-discharge truck mixer. All standard sizes available, as truck mixers or as agitators. Write for catalog 198-A.

THE T. L. SMITH COMPANY

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Look into its History

Smith-Mobile is the ORIGINAL high-discharge truck mixer backed by 10 years of experience designing and perfecting high discharge truck mixers and more than 40 years' specialized experience manufacturing concrete mixers of every size and description. Hundreds of Smith-Mobiles are now in successful operation. So, why gamble with new and untried machines? Play safe! Buy SMITH-MOBILE!

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725 EAST 140th ST. NEW YORK, N. Y.

Phone: MElrose 5-7704-5-6

A section of reinforcing bars held in alignment by special clamps above and below the welding points, ready for the welders to go to work.

High Bridge for Road And Railroad Relocation

(*Continued from page 8*)

they had to be thoroughly qualified, capable of making a weld of this nature which would pass certain breakage tests made by the Bureau of Reclamation. To qualify, each man had to weld two test bars under conditions approaching those on the job. For this purpose a wooden cage was made up, with vertical 2 x 2's spaced similarly to the spacings of the reinforcing bars on the job. Then he had to weld his test pieces inside this cage, getting in between the 2 x 2's. For some, the welding cage turned out to be the dog house.

Having made two test welds, there was a lapse of a week or two while the test bars were sent to a distant laboratory and broken and the results returned. Sometimes the men would wait that long, and then again they would get another job and never show up to see how the test came out. If a welder did return to follow up his test and it was approved, he then went to work, during the course of which the joints he made were cut out about every hundred welds and tested to see that his work continued to be up to standard.

Concreting

Concrete pouring on each pier followed quite closely the setting up and welding of the reinforcing steel. Seven-ply plywood forms ¾ inch thick were used, and these were used over and over again. The total amount of concrete in the bridge piers and foundations is 96,275 cubic yards.

Another unusual feature of Piers 2, 3, and 4, in addition to their height, is the fact that the foundation blocks were cooled after pouring, just as the blocks in a large dam are cooled. The Bureau of Reclamation, which is building the bridge for the joint use of the Southern Pacific Railroad and U. S. Highway 99, specified that the cooling system coils be placed on top of the rock and on top of each lift of concrete before the succeeding lift was placed. Thermometers were embedded in the usual manner and cooling water circulated through the coils until the specified temperature was reached.

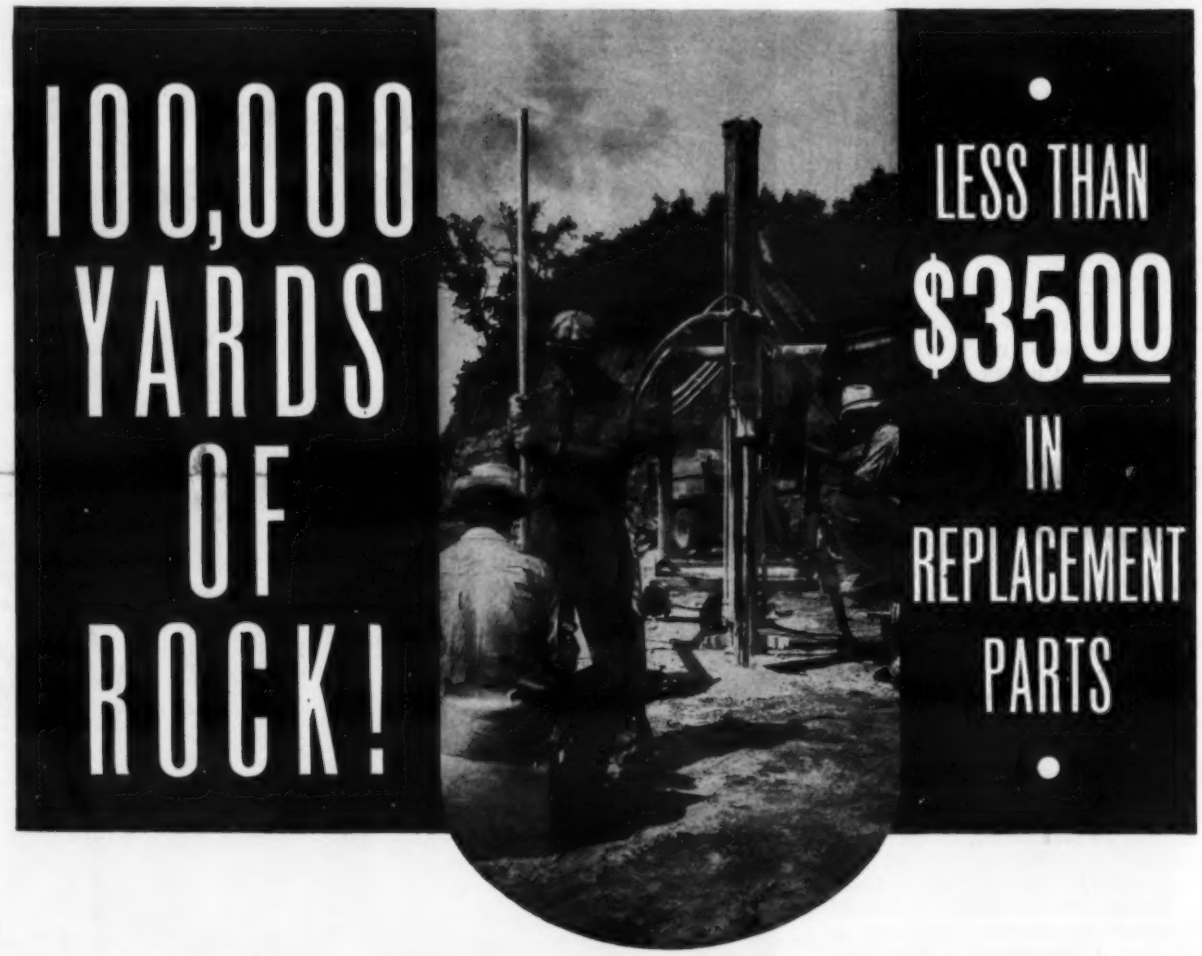
Personnel

The $5,000,000 Pit River Bridge is being built by the Bureau of Reclamation as part of the railroad and highway relocation necessitated by the construction of Shasta Dam, part of the Central Valley Project in California. The Union Paving Co., San Francisco, was awarded the contract for the substructure for $1,138,288 and the American Bridge Co. is contractor for the superstructure. H. L. Morisette was Superintendent and L. W. Hunt Engineer for the Union Paving Co. R. S. Calland is Acting Supervising Engineer of the Central Valley Project for the Bureau of Reclamation and Ralph Lowry is Construction Engineer in charge of the Shasta Division.

Rubber Products for Construction Industry

The complete line of Vitalic mechanical, automotive and industrial rubber products is described and illustrated in literature recently issued by the Continental Rubber Works, Erie, Pa. This line includes all kinds of hose, specializing in air, steam, water, and suction hose, fan belts for trucks and for air compressors, conveyor and bucket elevator belting, floor matting, pump valves, all types of tubing, and rubber wearing apparel.

Complete data on the product in which you are particularly interested may be obtained by writing direct to the manufacturer and mentioning this item.



• It isn't any record—simply normal performance for the good Cleveland DR8 Wagon Drill. Two of these rigs were used on the job, and the machines were kept at it, seven days a week, one, two, and often three shifts per day. The rock was variable, much of it hard, and the whole formation full of broken ground and faults. It was tough going, all the way. Some machines simply "can't take it" when put against a task like this. But the two good Cleveland DR8's sailed right through with the minimum in required repairs and lost time.

Have you a tough job ahead, and do you want to see what a Cleveland wagon drill will do in your own ground, with your own drill operator? Simply wire us where to demonstrate. You'll be surprised at the delivery action you will get!

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TREMENDOUS POWER
SMOOTH ACTION
LONG WEAR LIFE

They get the job done—save time—keep going.

Whatever your service, we have what it takes to do the job and will guarantee results.

Just tell us what you need.

Gatke QUALITY
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FRICTIONS - BRAKE LININGS
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GATKE CORPORATION, 224 N. La Salle St., Chicago

Equipment for Building And Maintaining Roads

The White Mfg. Co., 1227 W. Beardsley Ave., Elkhart, Ind., has recently issued a new catalog devoted to its line of equipment for the construction and maintenance of roads. These include traffic line markers, material driers, pavement repair trucks, asphalt plants, pugmill mixers, concrete vibrators, tar kettles, tractor loaders, tool and surface heaters, kerosene torches and concrete-mixer heaters. Various models of each piece of equipment are illustrated and described in detail, and specifications are given.

Copies of this catalog, No. 32-A, may be obtained by writing direct to the manufacturer and mentioning this item.

Wheelbarrows and Carts

The complete line of Sterling wheelbarrows and concrete carts for handling sand and gravel, concrete and other materials, in a variety of styles and sizes, is described and illustrated in Catalog 54, copies of which may be secured by interested contractors and state, county and town engineers direct from the Sterling Wheelbarrow Co., Milwaukee, Wis.

Sterling wheelbarrows are equipped with steel wheels or with pneumatic-tired wheels, the steel trays are all welded and are strongly braced for service and long life. The carts, of similar sturdy construction, are available in capacities of 6 to 9 cubic feet.

New Mack Vice Presidents

The Mack-International Motor Truck Corp., 34th St. & 48th Ave., Long Island City, N. Y., recently elected W. R. Walker and H. E. Seanor Vice Presidents of the corporation. Mr. Walker is a special representative with liaison duties between the Mack home office and the various governmental departments on all United States National Defense orders. Mr. Seanor is Manager of the Public Works Department.

How the TOUGH Jobs BECAME STEADY JOBS...

1700 1600 OF THE TOUGHEST EXCAVATORS EVER BUILT — THAT'S P&H ROLLED STEEL DESIGN

S-M-O-O-T-H AS STEAM—P&H'S NEW HYDRAULIC CONTROL. TRY IT YOURSELF!

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It's the interruptions that run up costs when the digging gets tough. To insure steadier digging, P&H turned to the huskiest construction known . . . rolled alloy steels, all welded.

Today, more than 1700 of these new design P&H excavators have proved their extra strength with steadier digging on all kinds of jobs. P&H is the *only* one with both upper and lower structures built *entirely* of tough, rolled alloy steels.

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C. & E. M. Photo
The two-door distributing bucket of a Koehring paver spreading concrete on the Harlem Contracting Co.'s subcontract for concrete paving in New York City.

Parkway Extended To Bridge Approach

(*Continued from page* 13)

In establishing this mix, the sand was increased by 3 per cent, 1 for the moisture and 2 for workability, and the stone decreased accordingly. The water content, including the moisture in the sand, amounted to approximately 5.5 gallons per bag of cement. The concrete yield per batch was 37 cubic feet, or 6.1 square yards of 8-inch uniform pavement.

Forms, fine grade, expansion joints and tie bars were kept well ahead of paving so that the contractor's organization caused no delays. Just ahead of pouring, ½-inch deformed round tie bars 5 feet long and spaced 2 feet 6 inches on centers, were set in key plates on the forms and then the key plates and forms oiled by means of a hand spray.

The individual batches were released from the trucks by the truck spotter, using a long pipe to get the necessary leverage to unlatch the gate. The Koehring 34-E paver, No. 1 of the new model with the 2-door distributing bucket, ran along the grade outside the forms. The subgrade was sprinkled by a hand hose just ahead of spotting the big batches on the grade where four pit men spread them uniformly ahead of the finishing machines. One man with a concrete spade worked along both forms in addition to a Roeth mechanical vibrator which was used along both the forms and the expansion joints. The concrete was poured in two courses, the bottom course being struck off 2½ inches below the top of the forms so that the welded fabric reinforcing could be placed readily. As the pouring of base continued, one of the pit men would take a shovel of concrete and place it under the tie bars so as to hold them horizontally as the concrete was poured around them.

The top course was struck off by pulling a steel-shod heavy timber over the forms by means of a cable attached to the hinged steel boom mounted on the paver frame. This was later supplanted by a power winch, which made it unnecessary to move the paver every time the concrete was to be struck off.

Carbon black in suspension in the amount of 3 per cent by weight of the cement was added to each batch for the top course. One man kept pails of the carbon prepared ahead, pouring in emulsified carbon black up to the elevation of two wires threaded across the pail at the proper elevation. It was then stirred carefully before being poured in on top of the dry batch in the skip. This amount of carbon gave a distinctly black character to the top course so that when the concrete was finished and cured it gave the impression of an asphaltic surface.

Under the conditions described the paver delivered an average of 238 batches in an 8-hour working day with the best day's record 270 batches. The forms were stripped the morning of the day after pouring and then the face of the concrete sprayed with curing material. To prevent coating of the tie bars lying flat against the concrete in the space formed by the key plate, the operator used a novel protecting device consisting of a sheet of galvanized iron the length of the tie bar exposed, and bent in at the top so that it fitted into the keyway. This was on a long handle so the

(*Concluded on next page*)

The Original BucketruX
Trade DEMPSTER DUMPSTER Mark
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To solve your haulage problems, and solve them efficiently and economically, follow this nationwide swing to Chevrolet. Your Chevrolet dealer is ready to give you a convincing demonstration, any time you say.

CHEVROLET MOTOR DIVISION, *General Motors Sales Corporation*
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FEATURES
★ TWO NEW VALVE-IN-HEAD ENGINES . . . STANDARD: 174 FOOT-POUNDS OF TORQUE—90 HORSEPOWER . . . "LOAD-MASTER": 192 FOOT-POUNDS OF TORQUE—93 HORSEPOWER*
★ NEW RECIRCULATING BALL-BEARING STEERING GEAR ★
NEW, MORE COMFORTABLE DRIVER'S COMPARTMENT
*Optional on Heavy Duty models at extra cost

60 MODELS
ON NINE LONGER WHEELBASES . . . A COMPLETE LINE FOR ALL LINES OF BUSINESS

"THRIFT-CARRIERS FOR THE NATION"

Concrete Paving On N. Y. C. Parkway

(*Continued from preceding page*)

spray man did not have to stoop down to hold it over the tie bar.

Finishing and Curing

Immediately behind the pit men, the Blaw-Knox and Flexible Road Joint Machine Co. finishing machines neatly troweled the surface course and one man followed immediately behind when the second slab was being poured to clean the first slab of any concrete carried over onto it. The machine finishing operation was followed by two men operating a 16-foot longitudinal float, after which the surface was carefully checked with a 10-foot straight-edge. Then any high or low spots were worked over with a 4 x 1-foot long-handled float when needed. The finishers then edged the slab and dragged a strip of burlap over it, following which one of them gave the surface the fiber-broom marking to impart a non-skid surface.

The expansion joints were edged by digging out the concrete over the surface of the joint, inserting a ¾ x 1-inch stick on top of the cleaned top of the redwood joint and then using the standard edging tools with the stick as a guide. Following this, the asphalt blend of the Hunt Process was sprayed directly from the drum by a power unit for curing the slab. Four finishers handled all of the work, including the operation of the longitudinal float.

Personnel

This 2,300-foot portion of the Hutchinson River Parkway extension was paved by the Harlem Contracting Co., Inc., of New York City, under a subcontract from National Excavation Corp. of New York City. E. R. Banks was Superintendent for the subcontractor, and Ralph Taylor for the general contractor. For the New York State Department of Public Works, the work was done under the direction of J. J. Darcy, District Engineer, with C. R. Bucher as Engineer in Charge and Harry Simberg as Resident Engineer.

New Lighting Plants Added to Kato Line

Three new low-speed 1,200-rpm models have recently been added to the line of Katolight plants made by the Kato Engineering Co., Mankato, Minn. The new sizes are 5,000, 7,500 and 10,000 watts, with either two or three-wire service or three-phase, at 60 cycles. The 5,000-watt size can be furnished with full automatic control and the larger sizes are available only with remote control.

The generators are of the revolving armature type, the generator frame being mounted directly to the engine bell housing. The plants are furnished both with a separate exciter attached to the outer generator end bell and also with the exciter winding carried on the main a-c armature. The complete engine and generator assembly is mounted on rubber, permitting the installation of the plant without bolting it down. The design is such that if the plant is used in a portable truck or moving vehicle it can be anchored without restricting the action of the rubber mountings. These units are powered by a LeRoi 18.5-hp 4-cylinder 4-cycle water-cooled engine.

Literature covering these and other units in the Katolight line may be secured direct from the manufacturer.

Who's Who in Engineering

The fifth edition of *Who's Who in Engineering*, a biographical dictionary of the engineering profession, has recently been published. Edited by Dr. Winfield Scott Downs, the volume of 2107 pages contains the professional records of over 15,000 engineers, 25 per cent more than in the previous edition.

Copies of this valuable reference book may be secured from the Lewis Historical Publishing Co., Inc., County Trust Bldg., Eighth Ave. & 14th St., New York City. Price: $10.00.

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It's the most Modern Pressure Distributor made today. Exclusive Features give speed of operation and assure 100% Efficiency. Be sure your next Distributor is a "Spray Master."

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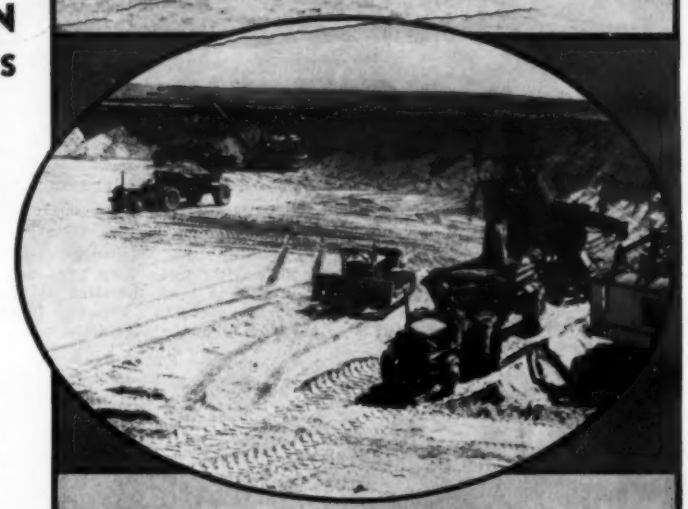
Use 38 Bottom-Dump EUCLIDS For Kanopolis Dam

Seventeen million cubic yards or 90% of all the excavation for this huge flood control project is being hauled by Bottom-Dump EUCLIDS. Working with their usual speed and economy, 38 Euclids average over 45,000 cu. yds. each 16-hr. day on operations such as these:

Hauling an impervious mix from a special elevating grader with a 12-ft. vertical blade, eleven Model "F" 14-18 yard Euclids average about 870 loads per day on 6000 ft. haul . . . Seven Model "F" Euclids of same size working under 48" elevating grader average about 700 loads of sandy clay per day on 3500 ft. haul to dyke . . . Hauling sand from two 3-yd. and 3½-yd. shovels, eighteen Model "L" 24-30 yard Euclids average about 870 loads per day on 10,000 ft. haul.

Why not visit Kanopolis Dam and see Bottom-Dump EUCLIDS prove again that they are unequaled for such gigantic tasks.

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO



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WILL DRY UP ANY EXCAVATION
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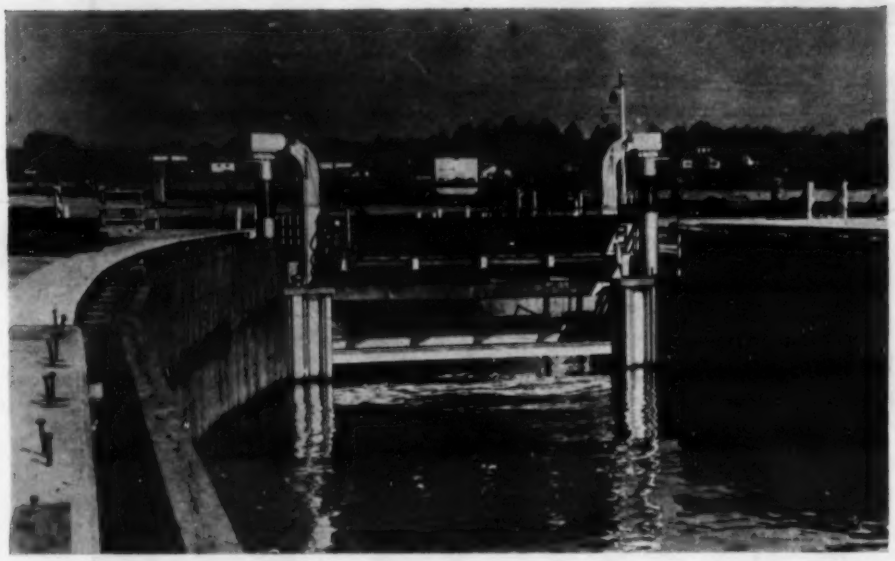
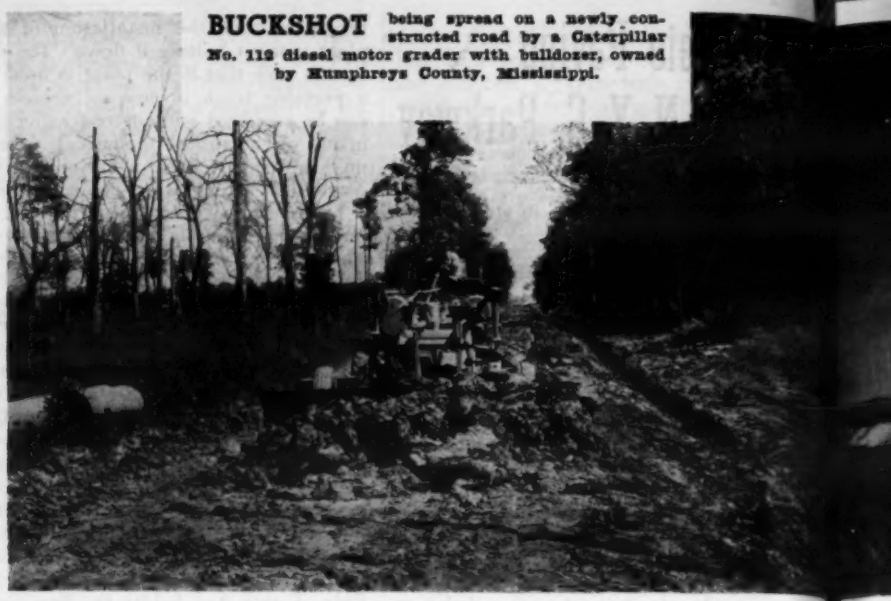
Bureau of Reclamation Photo

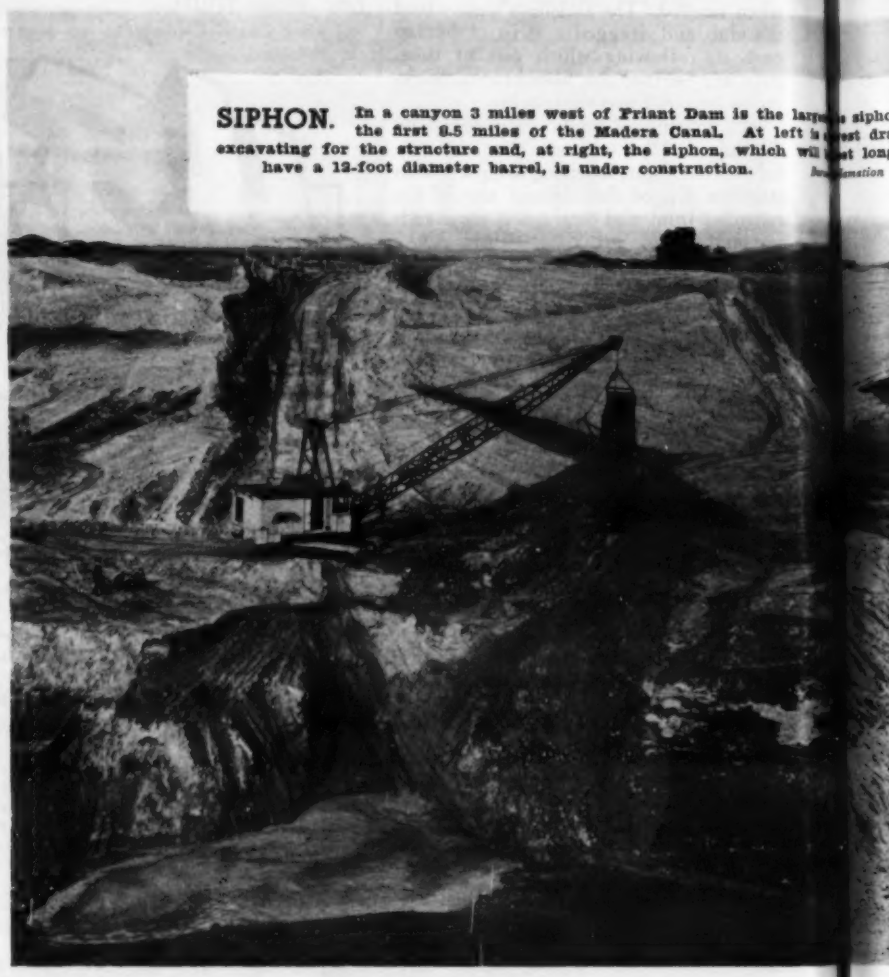
GIANT bell mouths for the permanent outlet pipes for the San Joaquin River at Friant Dam in California being inspected before being hoisted by cranes over the tall construction trestle and installed in the upstream face of the dam.



JACKS find unusual application. Two Joyce Materialift jacks with 17¾-inch pistons and powered by Joyce electric pumping units have been installed at Mackinac City, Mich., to raise and lower the transfer bridge apron or approach to a highway ferry, so that the apron will always be at a proper level with the boat deck.



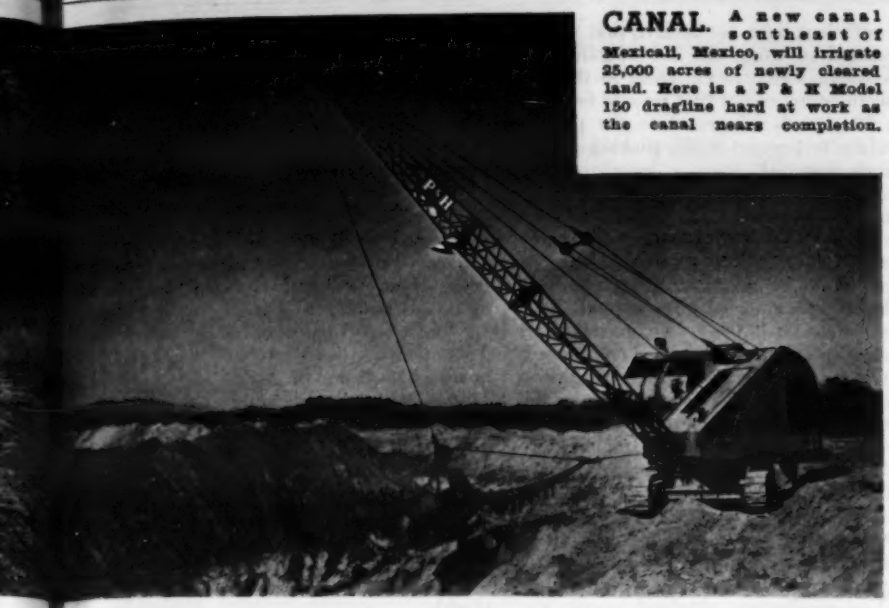
BUCKSHOT being spread on a newly constructed road by a Caterpillar No. 112 diesel motor grader with bulldozer, owned by Humphreys County, Mississippi.



SIPHON. In a canyon 3 miles west of Friant Dam is the larg siph the first 8.5 miles of the Madera Canal. At left is est dr excavating for the structure and, at right, the siphon, which wil t lon have a 12-foot diameter barrel, is under construction. *Bur mation*

AIRPORT. At Trumbull Airport, Groton, Conn., Dominic Ceravolo and his 1½-ton Dodge Job-Rated truck are at work on the airport expansion project to provide four 3,000-foot runways for Army Air Corps pursuit planes.

DEFENSE construction speeds ahead. Here a D4 tractor and LeTourneau bulldozer, owned Ferguson-Oman Co., maintains the truck roads leading to the Koehring shovel at Wolf Creek Ordnance Plant at Milan, Tennessee.

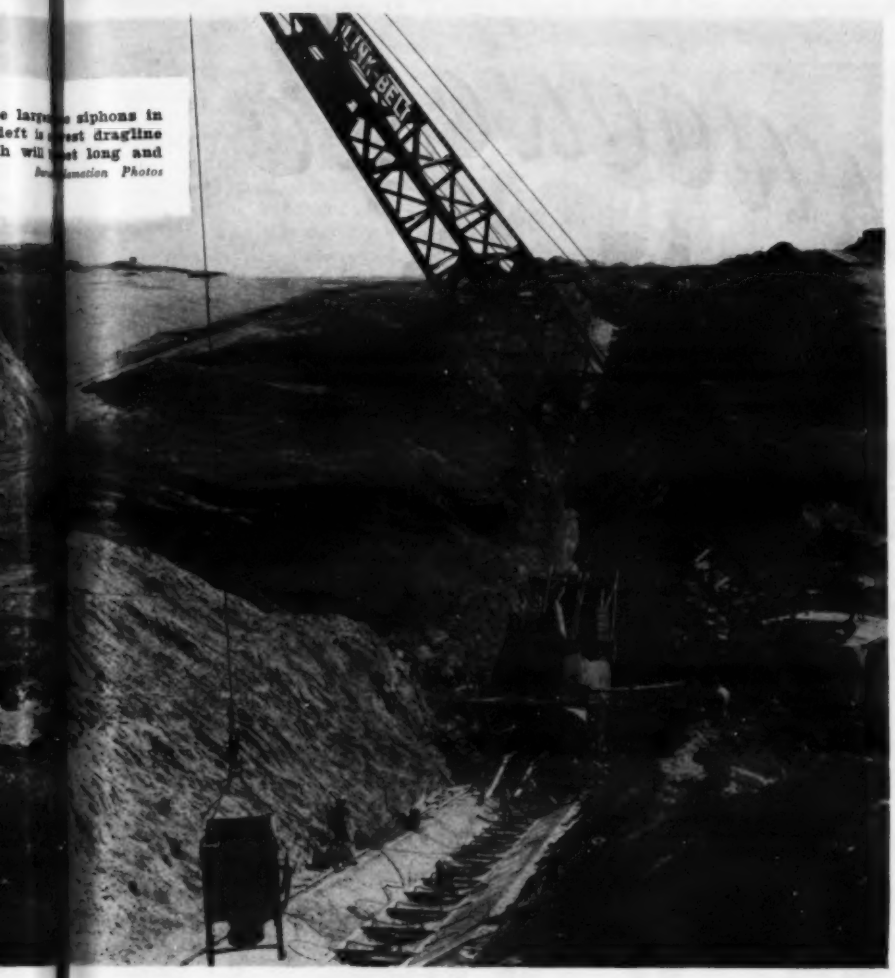


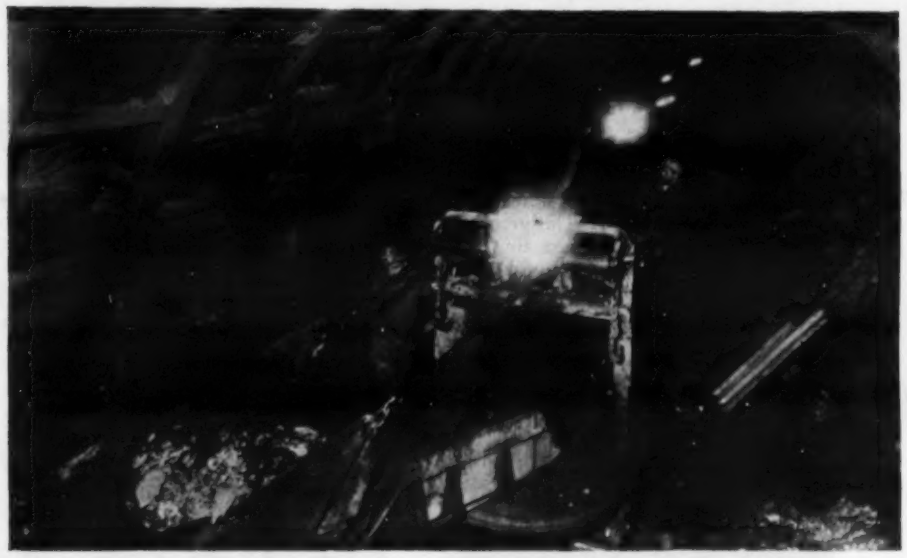
CANAL. A new canal southeast of Mexicali, Mexico, will irrigate 25,000 acres of newly cleared land. Here is a P & H Model 150 dragline hard at work as the canal nears completion.

Bureau of Reclamation Photo

GALLERY. This is one of many passageways, totaling several miles in length, extending through every portion of Shasta Dam for purposes of inspection, drainage, and grouting. This one is 7 feet high and 5 feet wide.

e larg siphons in
left is est dragline
h will et long and
Reclamation Photos





MUCK, tons of it, is being excavated on the great $298,000,000 Delaware Aqueduct Project which will add 540 mgd to New York City's water supply. On the Samuel B. Rosoff contract, six Conway mucking machines equipped with Hewitt Maltese Cross mucker belts handled more than 750,000 cubic yards of material.

LEAN-UP after floods. A TD-9 TracTracTor and ¾-yard Be-Ge front-end shovel used to remove 700 to 0 yards of flood debris from Highway 395 in California.

MOUNTAIN TOP or in the valley, everywhere the construction industry is making its contribution to this nation's security. Here a D8 tractor and LeTourneau bulldozer, owned by B. A. Simeone, Inc., is clearing land for the construction of an airport on top of the White Mountains in New Hampshire.

Bituminous Surfaces In Winnebago County

Experiences of Illinois County in Various Types Of Low-Cost Bituminous Highway Construction

By A. R. CARTER, County Engineer, Winnebago County, Illinois

✦ THE construction of bituminous roads in Winnebago County, Illinois, dates back to 1916, when T. G. Levings, Highway Commissioner of Rockford Township, built several types of surfaces, ranging from surface treatment to penetration macadam. Because of the large mileage of traffic-bound macadam roads which he had built and because of the ever-increasing automobile traffic which made the maintenance of a satisfactory surface exceedingly difficult, the Commissioner devoted most of his activities to surface-treatment work.

This work is not to be compared with the present A-1 specification, consisting of the application of a prime coat of bituminous material, either light tar or asphalt, of about 0.25 to 0.5 gallon per square yard, then two applications of cover-coat bituminous material of about 0.3 gallon per square yard to which is added 15 to 25 pounds of gravel or stone chips. The original work, if new, consisted only of a light application of prime tar, then one application of heavy tar then known as Tarvia A. A light application of pea gravel was cast over the surface, usually by hand labor standing on the load of gravel and scattering the gravel as the truck backed over the surface. Many miles of this type of surface were built in Rockford Township and a number of miles of it are serving traffic today. The great objection to these old roads are that they were built during the "horse and buggy days" and have an excessive crown.

County Bituminous Work

Winnebago County did not engage in this type of work until 1935, when 0.6 mile of 20-foot surface was constructed, similar to the A-1 specification, although we had not heard of this specification at that time. The cost of this short section was $0.19 per square yard.

The same year two short sections of road mix were constructed, on which were used the surplus fine materials on the surface of a traffic-bound crushed-stone road, to which was added gravel graded from 2 inches down to ½-inch on one section and from 1 inch down to ⅜ inch on the other. The first section was 2 inches compacted thickness and the second, 1½ inches compacted. Both of these sections have given excellent service and required little maintenance. The 2-inch section cost $0.36 per square yard and the 1½-inch section, $0.26 per square yard. Tar was used in all of this work.

The major portion of the bituminous construction in Winnebago County has consisted of the A-1 specification. When the road surface is satisfactory and there is sufficient base, we believe that we are justified in using the A-1 specification modified, which is the same as the A-1 specification except that we add from 10 to 12 pounds of gravel to the primed surface to prevent traffic picking up the prime material.

Winnebago County roads are built mostly of crushed stone, 10 inches loose in thickness, and in most cases this material is not as hard as it should be. For that reason we have a surface containing a large percentage of fine material. This necessitates using more prime material than if the surface were hard-compacted. Therefore we use from 0.4 to 0.5 gallon of RT-2 per square yard, and in the case of MC-1, we have used nearly 0.6 gallon per square yard. Immediately after the application of the prime material we apply about 12 pounds of gravel per square yard, meeting the specifications for cover coat material. This aggregate is applied by a Buckeye spreader.

Two results are obtained by the application of this material. First, it is not necessary to close the section to traffic, as the gravel prevents vehicles from picking up the bituminous material. Second, we add this extra amount to the thickness of the mat. Of course, we endeavor to keep traffic off the surface until it has become cured but this is more for the protection of the car and the peace of mind of the driver than for the protection of the road surface.

The first cover is next applied, using 0.3 gallon of bituminous material and about 20 pounds of gravel meeting the specifications for cover coat material. This operation is followed by the second cover coat, using the same amounts of bituminous material and gravel. It is then preferable to omit the seal coat for about 30 days, although satisfactory results have been obtained by applying the seal coat immediately upon completion of the last cover coat. Also, in some cases, the seal coat has been omitted until the following season, but we do not consider this generally advisable.

(*Concluded on page* 35)

CUMMER
ASPHALT PLANTS

Portable Combination Hot and Cold Mix Plants
Portable Hot Mix Plants
Stationary Combination Hot and Cold Mix Plants
Cummer Combination Dryer-Coolers.
Steam Jacketed Mixers 400 to 8000 pounds capacity.
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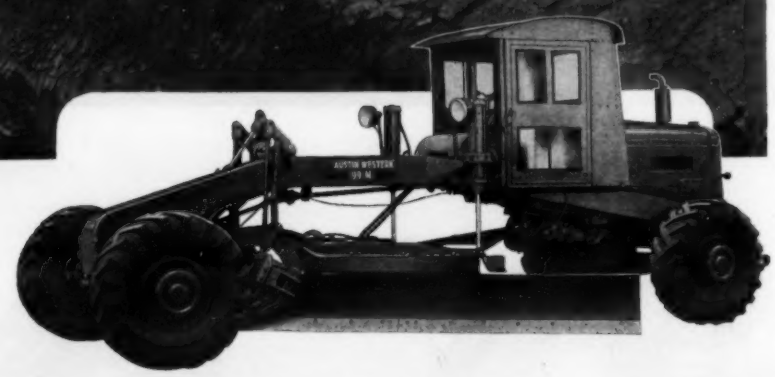
THE F. D. CUMMER & SON CO.
Euclid and 17th, Cleveland, Ohio



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MACHINE EMBODYING
ALL OUTSTANDING
"99" ADVANTAGES

A motor grader without power on the front wheels is like a draft horse with roller skates on his front feet.

● The New "99-M" with its monorail frame enables you to take the fullest advantage of All-Wheel Drive and All-Wheel Steer, on jobs you wouldn't think of tackling with a conventional motor grader. See the new "99-M" perform. Learn how many more jobs its live tractive weight and ease of control will help you clean up better . . . quicker . . . cheaper! THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.

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Blade Graders
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Rollers • Roll-A-Planes
Motor Sweepers
Bituminous Distributors
Shovels and Cranes

Austin-Western

The new H-S core drill.

Small Core Drill For Pavement Tests

When the Testing Engineer of a highway department wants a core from a pavement, it sometimes involves considerable effort and expense to take out a full-sized drill to get the desired cores. The new H-S heavy-duty portable abrasive speed drill, which can be easily hauled on a light delivery truck and removed for work directly on the pavement, is made by Howe-Simpson, Inc., 50 East Broad Street, Columbus, Ohio.

In recent tests with this machine, 5¾-inch diameter cores were taken from an average 7-inch depth of standard concrete highway with steel mesh reinforcing in 15 to 22 minutes per core. The machine is operated by a 3-hp gas engine and is built with roller bearings. Like its smaller counterpart, the H-S portable abrasive speed drill, it produces a neat, clean and accurate core.

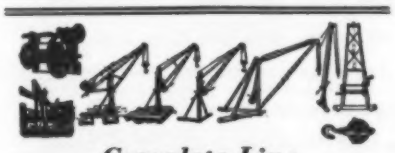
The smaller speed drill will readily drill concrete for the insertion of reflector buttons. Recently, a highway in Columbus, paved with a very hard glazed brick, was drilled for this purpose. On this particular installation a small gasoline electric generator unit was used to produce the electric current to operate the drill motor of the H-S portable abrasive speed drill.

Further information on the small electric-operated unit, or the larger portable unit, will be furnished on request.

New Truck Crane

Because of its special lattice-type all-welded construction, the 80-foot boom of the new P & H Model 255-A truck crane is not only light in weight but, according to the manufacturer, possesses such strength and stability that it can handle a 30-foot jib, thus giving a total boom length of 110 feet. This boom length, in conjunction with the powered planetary lowering device on the main hoist line and the planetary boom hoist, provides flexibility and a constant control over the movements of the crane boom.

Mounted on a Mack truck chassis, this P & H truck crane, made by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., is equipped with hydraulic control, a full-vision cab, low-type mounting, all-welded truck frame, and a special live roller circle.



Complete Line of DERRICKS *and* WINCHES

HASGEN DERRICK CO.
3101 W. Grand Ave. Chicago, Ill.

Special State Car Services Equipment

(*Photo on page 48*)

The Nevada Department of Highways has equipped a 1940 Plymouth panel delivery truck with all the necessary units and tools to adjust and repair the automotive equipment used by its engineering field parties. This outfit travels from job to job, making repairs in the field. By making regular visits at frequent intervals to each project, small items are repaired before they can cause major breakdowns.

The equipment carried by this repair outfit includes a 650-watt Onan gas-driven generator and a small Curtis compressor driven by the same engine, a complete acetylene welding and cutting outfit, electric drills, and all other tools required for the repair of automotive equipment. This outfit has been in service a year and it is reported that the frequent maintenance visits have been reflected in reduced operating costs.

STERLING BALANCED WHEELBARROWS

All trays have double thickness at corners. Both laps are crimped over a continuous butt-welded reinforcing rod.

NO. S-12—FOR DRY MATERIALS WITH PNEUMATIC TIRE WHEEL

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A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

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Keep the Roads Open!

This winter your Highway Department must be prepared to face any contingency that may be caused by the national emergency. Keeping the roads open under all conditions for the unobstructed movement of vital defense materials, military supplies and troops, is essential to our security as a nation.

Take no chances! Turn the job over to rugged, powerful WALTER SNOW FIGHTERS, specially engineered and constructed for the gruelling needs of snow removal. Walter 4-Point Positive Drive provides 100% traction—maintains tremendous driving force on drift-choked, hard-packed or icy roads—keeps going under conditions that stall rear-wheel and ordinary 4-wheel drive units. Walter Snow Fighters quickly justify your investment by speedy, thorough, low-cost snow displacement and years of economical service. Be prepared for the emergency ahead. Get the facts NOW—and place your orders early for Walter Snow Fighters. Write for literature.

NOW is the time to order

WALTER SNOW FIGHTERS *with*

- 4-POINT POSITIVE DRIVE
- Automatic Lock Torque Proportioning Differentials
- Suspended Double Reduction Drive
- 10 to 1 Range Transmission, 6 speeds forward, 2 reverse, powerful low gear, fast high gear, single lever control.

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C. & E. M. Photo
Driving shells for Raymond concrete piles at Hangar No. 6 at the recently opened Washington National Airport.

Design and Layout Of National Airport

(*Continued from page 9*)

ten off on the job, and then it was sold at the conclusion of the work for $7,500. The aggregate used for runway construction was not processed, but merely screened.

Runway Layout

There are four runways provided, the two longest being 200 feet wide and the two shorter runways being 150 feet wide, while the taxi strips are 75 feet wide. The longest runway is the N-S runway, which is 6,855 feet long and is equipped for blind landing. Next in length is the NW-SE runway, 5,210 feet long, followed by the NE-SW runway, 4,892 feet long, and the E-W runway, 4,100 feet long. The two wider runways have 150-foot gravel shoulders on each side, and the two narrower ones have 175-foot gravel shoulders on each side.

The design of the pavement for the runways took into account the supporting value of the subbase, which tests showed would readily support a load of 80 pounds per square inch without undue displacement. This led to the selection of a pavement thickness of 3½ inches of asphaltic concrete laid in two courses, a base course 2 inches thick and a wearing course 1½ inches thick.

Aprons and Service Roads

The loading area or apron in front of the Terminal Building is composed of 100-foot wide black concrete adjacent to the building, and 250 feet of 4-inch asphaltic concrete pavement of the same thickness and mix as the runways. The black concrete was made by adding two pounds of carbon black per bag of cement to the mix.

The aprons in front of the hangars are 250 feet wide, 4 inches thick, and are built of a 2½-inch base course and a 1½-inch top course of asphaltic concrete.

A 24-foot service road of asphaltic concrete 3 inches thick on a stabilized base runs below the back of the Terminal Building, and is designed for one-way traffic for the use of the Post Office, Air Express, and supplies for the Terminal Building. By depressing this road, it is entirely out of sight of the parking area, which is terraced on either side and back of the Terminal Building, so that visitors may view the entire field without leaving their cars.

Drainage

The very character of the fill for the airport makes for excellent drainage; but the removal of surface water from the runways is provided for by a crown of 1 per cent across the runways and the shoulders to catch basins located 53 feet from the edge of the pavement. The drainage pipe for taking care of this storm water varies from 10 to 60 inches in diameter, and is made of reinforced concrete.

Terminal Building

Work on the well-planned Terminal Building was started in May, 1940, when 1,400 piles averaging 40 feet in length were driven at the rate of 100 piles per 20-hour day by the Raymond Concrete Pile Co., using a drop hammer for driving the shells and mandrel into the ground. The piles were then filled with concrete from a truck mixer. This dominating structure, which contains facilities for three air lines, the Post Office, Air Express, Weather Bureau, restaurants, Airways Traffic Control, and communications, is 540 feet long, 90 feet wide, and has a maximum height of 74 feet at the control tower. The Terminal Building was designed to give sightseers the very best opportunity to see the operations on the field. A concourse runs along three sides of the building, and terraces are also provided wherever possible.

Hangars

There are six hangars, five of which have doors 175 feet wide and 30 feet high, with provision for an additional opening 60 feet wide and 10 feet high at the top center to permit the entrance of planes with high tails. The sixth hangar has a 223-foot door, also 30 feet

(*Concluded on next page*)

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800 to 50,000 WATTS

3,000 WATT
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Finish the job quicker and save money with electricity.

Send for catalog describing generators and our complete line of portable poles for floodlighting.

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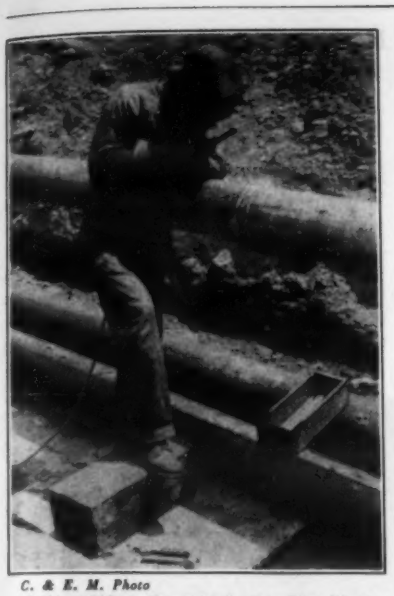
If you've got a job that calls for really big wire rope, check Bethlehem before you buy.

We've recently installed several large rope-closing machines. These machines are new, completely modern in design. They are controlled by the ace operators in our mill.

And note this fact: The steel that goes into Bethlehem wire rope is produced, from start to finish, by Bethlehem blast furnaces, open hearths, rolling mills, drawing blocks and patenting furnaces. Bethlehem controls every step.

Result? When you buy Bethlehem wire rope, whether it's large or small, you get rope that performs consistently, day after day, month after month. You get long average service . . . and after all, it's the average service that determines your rope costs.

BETHLEHEM STEEL COMPANY



C. & E. M. Photo

Butt-welding the 8-inch gasoline lines from the river storage tanks to the service pits in the apron.

New Airport Built At Washington, D. C.

(Continued from preceding page)

high. The doors are all of the sliding type, electrically operated. The hangars are all paved with 6-inch reinforced-concrete floors on the existing clay subgrade.

Hangar No. 1 is built with a two-hinged arch with false abutments of precast concrete so that the arch actually appears to spring from the abutments. The arched girders have a rise of 50 feet, are 3 feet deep at the top, and 4½ feet at the ends. Tie bars consisting of three 1 x 6-inch plates are carried underground to furnish the tension members of each of the five arches. These tie bars are embedded in asphalt to prevent deterioration through rust. Hangar No. 7 will be like No. 1 described above, and 175 feet wide x 190 feet deep inside with 40-foot lean-to's on both sides and at the back for shops, laboratories, and offices. Hangars No. 2 and No. 3 are of the flat-roof type, with 175-foot door openings 30 feet high. Hangar No. 4 is 223 feet wide, while Hangars No. 5 and No. 6 are like No. 2 and No. 3.

All of the hangars except No. 6 are on foundations on the natural ground, while No. 6 has 410 Raymond concrete piles under one end. The air lines at the terminal will use six of the hangars, while No. 7, to be built later, will be used by the Civil Aeronautics Authority.

Lighting

The field is lighted by contact lights at 200-foot intervals along all runways and the taxistrips, while at the end of each runway are two 3,000-watt flood lights focused about two-thirds the length of the runway. Further to increase the safety of operation, Neon lights are installed at the ends of the runways, with a flashing red cross to signify that the runway is not to be used for landing. When the runway is clear, this cross changes to a green arrow.

Utility Services

Loading stations for fourteen planes are provided in front of the Terminal Building. At each loading station is a turntable on twelve 4-inch rollers to permit the easy turning of planes into position without wear on the tires or strain on the landing gear. In addition, there are service pits with counter-balanced covers making them easy to raise and to close without slamming. In these service pits are air-conditioning connections, telephone connections, pneumatic tubes to the air-line offices, four batteries and a charger with a 110-volt line and a water connection, and, in a separate pit, the gasoline connection, so that no service trucks need operate on the field.

There is one 8-inch domestic water line serving the field, and a fire hydrant line from an auxiliary pumping station located on the Potomac River. Three 8-inch electrically-welded gasoline lines lead from a barge station on the river at the extreme south end of the field, and gasoline is delivered by the Aqua system.

Four smoke pots are installed on the field to indicate the direction of the wind.

Personnel

The Washington National Airport was designed by the Civil Aeronautics Authority and constructed under the direction of the U. S. Engineer Department, with J. W. Moss Engineer in Charge, William W. Sullivan, Chief of Operations, and E. F. McCollum, Chief, Construction Section, U. S. Engineer Department. McIver Rountree was Resident Engineer for the Civil Aeronautics Authority, acting as Coordinator of Operations.

The Terminal Building and hangar plans were prepared by the Public Buildings Administration and were constructed under their supervision by John McShain Co. of Philadelphia, Pa. General inspection of stabilization and paving was under the Public Roads Administration, with the engineering work done by the U.S.A. Corps of Engineers.

The fourth Pan American Highway Congress will be held at the Fine Arts Palace, Mexico City, on September 15-24. U. S. manufacturers of road equipment, highway officials and others interested in the subject of highways are cordially invited to attend.

Only JAEGER
Offers This Modern
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SPEED AND TRACTION to match dual drum pavers on dry mixes. 4-Speed Automotive Transmission; working speeds to 18 F. P. M.; smooth, positive 4-wheel drive.

A SMOOTHER FINISH—with rigid, fully enclosed, spring cushioned 12" screeds, independently controlled.

COMPLETE CONTROL—banked levers, separate screed and traction speeds, fast hydraulic power lift for each screed.

4 FT. TELESCOPIC WIDTH CHANGES and many other advanced features. Send for new Bulletin on Finishers and Concrete Spreaders, Forms, Form Tampers.

THE JAEGER MACHINE CO.
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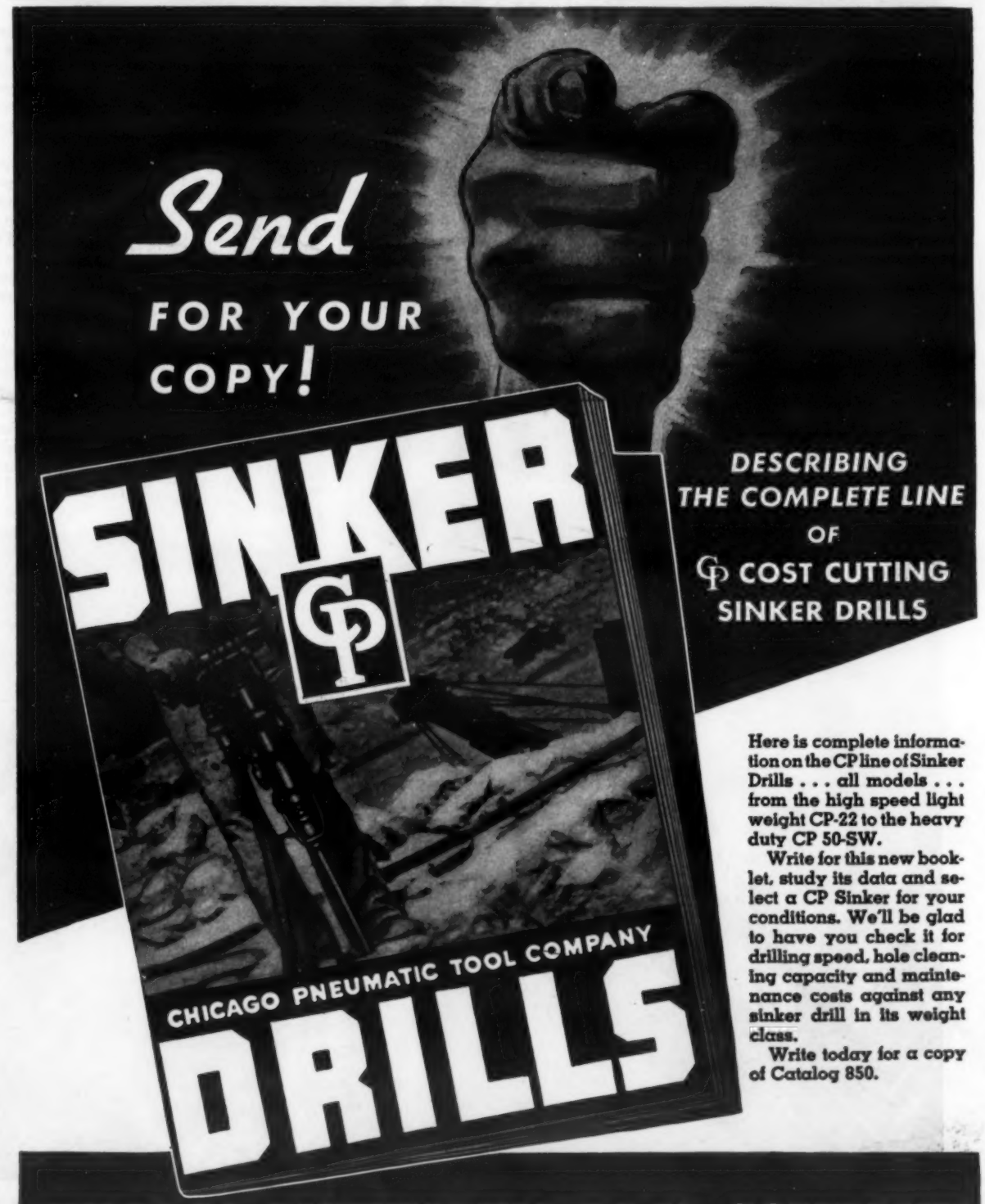

Here is complete information on the CP line of Sinker Drills . . . all models . . . from the high speed light weight CP-22 to the heavy duty CP 50-SW.

Write for this new booklet, study its data and select a CP Sinker for your conditions. We'll be glad to have you check it for drilling speed, hole cleaning capacity and maintenance costs against any sinker drill in its weight class.

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SALES OFFICES AND SERVICE STATIONS THROUGHOUT THE WORLD

Road Equipment Granted Priority, Vital to Defense

Priority status for machines and materials used in highway maintenance is an imperative national need, according to Leon Henderson, Administrator, Office of Price Administration and Civilian Supply, OEM.

In a recently announced program, he placed road maintenance high on the list of operations for which equipment shall be allocated prior to satisfaction of other competing civilian demands and, in some cases, prior to defense requirements. The order recognizes the danger of interruption of essential transportation due to inability to keep roads in repair. The preferred status is intended to prevent a shortage of highway equipment needed to keep existing facilities in a satisfactory condition.

Heavy-Duty Trailers

For over 25 years the Rogers Bros. Corp., Albion, Penna., has devoted its efforts exclusively to the manufacture of heavy-duty trailers. This continuous endeavor to build one thing well has led to the development of several advanced and original features. Through progressive evolution there has been produced, according to the manufacturer, a complete line of trailers that are strong but comparatively light, that may be loaded easily and moved with speed and safety and that give long periods of service with little repair expense.

The complete line of Rogers trailers is illustrated and described in detail in a new 30-page catalog recently issued by this company. Copies may be obtained by writing direct to the manufacturer and mentioning this item.

New Dealer Appointed For Speeder Shove

Link-Belt Speeder Corp., 307 Michigan Ave., Chicago, Ill., announce recently the appointment of Cunnin ham-Goggin Co., 610 W. Michigan S Milwaukee, Wis., as authorized distri utor for the complete line of Link-Be Speeder shovels-draglines-cranes, rang ing from fast, mobile ⅜-yard units t heavy-duty 3-yard machines. The terri tory covered by Cunningham-Goggin in cludes the eastern part of Wisconsin as well as the upper peninsula of Michigan.

800 MILES FROM HOME OFFICE

BUT COMPLETES BIG JOB AHEAD OF SCHEDULE

► Here was the picture ahead of D. W. Johnson, Inc., contractors from Newark, N. J., when they tackled a two-year dirt removal and seal wall flood control job in Indiana. They were operating 800 miles from headquarters. In attempting to better this two-year schedule they had to operate equipment 16 to 24 hours a day. That left little time for servicing and refueling—no time for breakdowns and delays.

They laid careful plans. Only new equipment was used—4 shovels, 10 tractors, and 7 trucks. They expected to use their own tank truck for servicing this equipment until they discussed their needs with a Standard Oil Automotive Engineer. They found that deliveries could be made when and where they wanted them—that Engineering Service was available at any time to help maintenance men keep the equipment on the job. They turned the whole problem of supplying fuels and lubricants over to the Engineer.

Then records began to fall—over 600,000 yards of dirt were moved in 90 days—250,000 gallons of gasoline and Diesel fuel were delivered to this equipment without one delay—equipment never lost an hour through failure caused by Standard Oil products or service.

Before you even bid on the next job in the Middle West get all the facts about this service that Standard Oil (Indiana) offers contractors. Just write 910 South Michigan Ave., Chicago, Ill. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

Copr. 1941, Standard Oil Company

STANDARD OIL COMPANY (INDIANA)

AUTOMOTIVE ENGINEERING SERVICE

LOWERS MILEAGE COSTS

County Highway Work In Winnebago County

(*Continued from page* 30)

For seal coat work we use 0.25 to 0.3 gallon of bituminous material and an application of about 15 pounds of seal coat gravel per square yard. If the seal gravel is rather coarse, as is allowed in the latest specifications, then 0.3 gallon should be used. For the past two seasons, when we have used tar for the prime and cover coats, we have used PA-3 for a seal coat, with good results. However, there is more tendency for bleeding by the use of this material than with some of the others.

Two sections of A-1 specification have been constructed, using MC-1 for prime and SC-8 for the two cover coats. One section was constructed by contract and one by day labor. On both sections the seal coat was omitted. On the contract section, there has been some bleeding which necessitated several applications of fine gravel or torpedo sand, and on the day-labor section, while there has been no bleeding, it was necessary to seal the outside 3 feet of the roadway as signs of raveling appeared.

Types of Aggregates

After much experimenting, we have decided that the gradation of the aggregates for this type of work should be about as follows:

AGGREGATE FOR PRIME AND COVER COATS

	Per Cent
Passing ¾-inch sieve	100
Passing ½-inch sieve	90-100
Passing ⅜-inch sieve	20- 60
Passing No. 4 sieve	7- 20

AGGREGATE FOR SEAL COAT

Passing ⅜-inch sieve	100
Passing No. 4 sieve	26- 45
Passing No. 10 sieve	3- 7

One section 2.8 miles in length was constructed by contract under C-1 specification, a bituminous road-mix of about 2 inches in thickness. Crushed stone from a local quarry and RT-6 tar were used for a bituminous mat. The surface was sealed about one month after the construction of the road. We found, however, that we did not use sufficient bituminous material in the road mix. When we came to apply the seal-coat material, we discovered the bituminous material was absorbed by the mixed course and the seal gravel was on the edge of the road. This section was sealed again the following spring with good results.

The analysis of the aggregate for this section was as follows:

COVER COAT AGGREGATE

	Per Cent
Passing 1-inch sieve	98
Passing ¾-inch sieve	92
Passing ½-inch sieve	80
Passing No. 4 sieve	52
Passing No. 4 sieve, retained on No. 10	35.2
Passing No. 10 sieve, retained on No. 40	30.6
Passing No. 40 sieve, retained on No. 200	21.4
Passing No. 200 sieve	12.8

SEAL COAT AGGREGATE

Passing ¼-inch sieve	100
Passing No. 10 sieve	5.8

In 1940 we constructed a bituminous surface 20 feet wide on about 8 miles of road for which the aggregate consisted of 10 inches of crushed gravel placed the previous season. Sufficient material was windrowed from the surface to provide a uniform depth of 3 inches loose. The aggregate was then moved to one side of the surface and one-half the width of the surface was primed, using 0.6 gallon of MC-1. After the prime had cured sufficiently, the aggregate was moved to the primed surface and the other half of the surface was primed.

The aggregate was then moved to the center of the road and mixed, using a Barber-Greene traveling plant. The bituminous material used was SC-4, 1.31 gallons per square yard. The mixed material was delivered from the machine in a windrow and after 3 to 5 days was spread evenly over the surface of the roadway, using first an Adams 12-foot grader pulled by an Allis-Chalmers LO tractor. For finishing, this grader was pulled by a Case Model LI industrial tractor. Compaction was obtained by means of a rubber-tired roller pulled by the Case tractor and final compaction by means of an 8-ton three-wheel roller. The edges of the surface were compacted by attaching a shaft to one end of the grader moldboard, with the shaft set at an angle of 45 degrees with the horizontal. At the end of the shaft was attached a heavy pulley which rolled along the edge of the surface to compact it.

Considerable difficulty was encountered in the construction of this section because of excessive rain and low temperatures. We purchased about 2,700 linear feet of Sisalkraft paper to use on this section which helped a great deal. But when we had a small tornado, the paper was hung up on the fence or deposited over in the farmers' fields. In spite of these difficulties, this section was constructed at a cost of $0.24 cents per square yard, using considerable WPA labor, but including the cost of reconstructing the shoulders on the entire section.

Samples taken from the windrow of material gave the following screen analysis:

COVER COAT AGGREGATE

	Per Cent
Passing 1-inch sieve	99.0
Passing ¾-inch sieve	92.3
Passing ½-inch sieve	80.3
Passing No. 4 sieve	58.9
Passing No. 4 sieve, retained on No. 10	45.0
Passing No. 10 sieve, retained on No. 40	30.5
Passing No. 40 sieve, retained on No. 200	28.1
Passing No. 200 sieve	21.3

Summary

A summary of bituminous construction in Winnebago County is as follows:

	Miles
A-1 specification constructed by the County	60.5
A-1 specification constructed by the State	5.5
Road mix, by grader	8.0
Machine road mix	8.0
Old surface-treated roads on State-Aid system	23.0
Surface-treated or road mix in Rockford Township	140.0
Total	245.0

Our construction for 1941 includes 14 additional miles of bituminous surface, A-1 specification, modified. The cost of A-1 type of surface has varied from $0.14 to $0.24 per square yard, with an average cost of about $0.21 per square yard. The section costing only $0.14 did not include a seal coat.

From a paper presented at the Annual Conference on Highway Engineering, University of Illinois, March, 1941.

The Thirtieth National Safety Congress will be held in Chicago on October 6 to 10, 1941.

TARPAULINS
ROAD MATS ★
WINDBREAKS

CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulco Road Mats and Burlap. Fulton products are good and prices are right.

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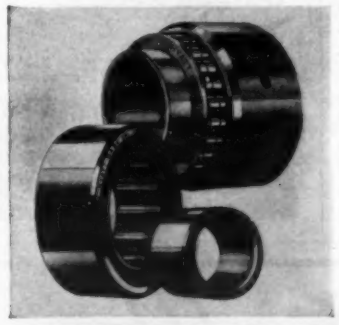
ALLIS-CHALMERS Model HD-10 Crawler Tractor, and the A-C grader it is pulling, employ Hyatt Roller Bearings for better operation.



BUILT TO TAKE IT Hyatt Roller Bearings are found in the toughest assignments! And where bearing precision as well as bearing capacity is vital, you'll find Hyatts just as extensively used. That's what we mean by Hyatt Quality—correctness of design and accuracy of manufacture to meet bearing applications of every description. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, N. J., Chicago, Pittsburgh, Detroit and San Francisco.

HYATT
ROLLER BEARINGS
QUIET

Contractors' Publicity Important to Industry

(*Continued from page 20*)

to realize that the same aphorism applies to a construction project without a contractor, a contractor to coordinate job operations," W. M. Holland, Executive Secretary, Indiana Highway Constructors, points out.

"If the public in general understood equally well the relationship of the contractor to a construction project, agreement would be readily forthcoming that the contractor is an essential part of a sound construction project. The construction industry in all its branches knows this, but the industry has been hiding its light under a bushel.

"The makers of 'Lily-White' tooth paste advertise their product, relating its many superior qualities and, recognizing the important relationship of the dentist to sound teeth, their appeal to the public is almost invariably concluded with an admonition about seeing your dentist. The dentist is no more important to sound teeth than the contractor is to a sound construction project. The only difference is that the construction industry has not stated its case to the buyer, John Q. Public.

"The equipment manufacturer, the producer of materials, and the contractor himself are or should be equally interested in educating the public to the fact, so well known to the industry, that the contractor is essential to sound construction. If each advertiser would allocate a small part of his regular advertising space, along with regular advertising copy, to relate the advantages of *construction by contract* the public would come to know.

"An excellent beginning would be 'Construction by Contract—The Most for the Money'. This slogan has already been instituted by the Associated General Contractors of America. Much more could be said, but the adoption of this slogan as an appendage to regular advertising copy would be a start, provided of course that the magazine reached the general public.

"To this end it would seem that a well-organized publicity campaign, including the manufacturer, the producer, the contractor and others, would produce the desired results."

It Can Be Done

Highway contractors of Illinois are receiving the public recognition which CONTRACTORS AND ENGINEERS MONTHLY is urging for the nation's entire construction industry, and some of the favorable Illinois press comments on the successes achieved by highway contractors and on the general advantages of the contract system have gone further and reached readers all over the nation.

This would not have been true three years ago, and Taylor G. Soper, Executive Secretary, the Illinois Road Builders' Association, believes that the ways in which they have changed public, official and press opinion will be of value to other organized groups in the construction industry who recognize that the American system of private enterprise must be re-sold to the nation; that it must be re-sold not only because of the important part taken by construction in the nation's economy, but so that whenever an emergency strikes, democracy will have the skilled tool of private contracting with which to get its "rush" job done efficiently and quickly.

"Contractors have an interesting story to tell," says Mr. Soper, "and we are telling that story here in Illinois. The public relations program of the Illinois Road Builders deals solely with highway contractors, but it is adaptable to the entire construction field.

"We tried, during the first year, to proceed as many other groups proceed, handling our own public relations. The result was that strictly Association work took all of our time and the road-building story remained out of the press. Then we secured the services of a public relations agency, Theodore R. Sills & Co. of Chicago, to direct a program for us. In Chicago a specialized agency was available, but other groups could achieve equally satisfactory results by employing an individual to handle public relations and publicity. The important point is to secure a competent agency or individual.

"As the program started, Illinois highway contractors faced the same problems now faced by all contractors: a public indifferent to the contract system, unfavorable legislation, and lack of recognition. Constant pounding away through all the media of public education, by word of mouth, lecture platform, radio, newspaper, magazine, billboards, is solving some of these problems. The public has become keenly interested in modernization of roads, no new road tax diversion has been proposed, there is a growing support for the contract system, and a growing recognition of contractors as a group.

"We have made widespread use of signs on all jobs undertaken by our member contractors. When a street or highway is blocked off for reconstruction, we erect a large sign assuring the public that the work will be completed in the fastest possible time and with a minimum of inconvenience. More than 500 such signs are in use in Illinois during busy construction seasons, giving also the name of the contractor and the fact that he is a member of our association. Our new signs this summer are stressing the contract system.

"A very important phase of our public relations work has been a speech schedule reaching into cities large and small in all parts of the state. Approximately fifty such speeches have been made before civic groups during the current year. This not only gives an opportunity to explain the facts of road building and the necessity of the contract system to a very powerful section of the electorate, but it provides a reason for local newspaper feature stories.

"Our suggestion for contractor action would be to organize an immediate effort to publicize the industry, the individual, and the contract system. Some program, such as is carried on nationally for highway contractors by the American Road Builders' Association, is indicated. But the effort should not stop there. Each organization which touches on the construction field should be enlisted and its support secured for continuous public education in the merits of contracting. Further than that, this organized effort should continue down to the smallest unit, the individual contractor. He can secure effective local publicity impossible for the publicity men of the association units to secure. If he is not news conscious, he can make some member of his staff responsible for advising local news outlets of every occurrence which has the elements of news. He can call on his local editor, to explain the importance of the contract system to that editor's pocketbook and to the national economy. He can ask the editor to include a sentence in all construction articles saying that the project will be, or was, built under the contract system.

"Naturally the very meritorious part that private contractors are playing in building for defense offers the greatest immediate opportunity for favorable national publicity and also for local publicity. It should not be too difficult to arrange for recognition of contractors at dedicatory services (where they seldom are included now), in radio presentations, and in press coverage.

"The problem of public relations and publicity should not be too difficult if

(*Concluded on next page*)

Wisconsin-powered Street Sweeper in winter service.

A full range of sizes: 1 to 35 HP.

Extremes of heat or cold; snow, rain; high or low humidity . . . make very little difference to Wisconsin HEAVY-DUTY air-cooled engines. They *start* and *run* with uniform ease and dependability, regardless of weather conditions. Maybe this DOES make a difference to you . . . Be Wisconsin-equipped for dependable power service . . . any time, anywhere, any job. Write: Dept. F-8.

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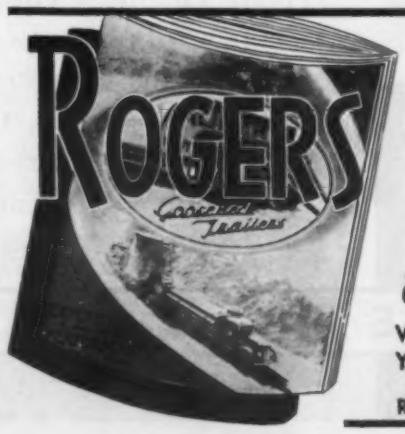

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Public Must Be Sold On Contract System

(Continued from preceding page)

each contractor, and each organization of contractors, will approach the problem in the same way he would approach a construction problem, by thinking hard and by hiring a competent person to handle the particular assignment."

Means to an End

Robert E. Harper, Director of Public Relations, American Road Builders' Association, offers a practical means to aid in achieving the goal we have been discussing, publicity for contractors and the contract system. First, Mr. Harper recommends the reading of *Speak Up for Democracy* by Edward L. Bernays, America's No. 1 public relations counsel and a director of the Public Relations Division of the A. R. B. A.

Then Mr. Harper directs your attention to the Highway Information Service, an authentic news agency, with headquarters in the International Building, Washington, D. C., and an established contact with more than 4,700 top-notch daily and weekly newspapers in every-one of the 48 states.

"Like any other accredited and intelligent disseminator of public information, Highway Information Service rigidly adheres to a policy that it believes to be for the public good," Mr. Harper states. "Part of this policy is the conviction that building roads by contract is better, cheaper, safer, wiser and provides longer public service for the public funds expended.

"Highway Information Service is one year old. It has done a good overall job. It now intends to localize its news-story appeal. To properly project this highway-contractor picture in local communities, H.I.S. needs local facts and figures, the five "W's" of a good news story—who, what, where, when, why—from the individual highway contractors about their various projects in their respective communities. This essential material will then be shaped in opinion-molding news stories and news pictures for syndication to H.I.S. newspaper friends in the area that any given project and its contractor serve.

"Here is a ready-made channel, an open door, through which to march the highway-contractor story of community service. Why not try this public relations medium?"

Conclusion

A survey of the public relations problem of the construction industry seems to indicate two immediate difficulties to be overcome: the apathy on the part of contractors concerning the need for a publicity campaign to insure a continuance of the contract system, and the reluctance on the part of contractors as individuals to go after publicity. The former is a part of the general public apathy about the preservation of everything for which this country has stood in the past, a democratic way of life, free enterprise, the value and dignity of the individual, all of which stand in peril in the world today. The second, the contractor's reluctance to go after publicity, is understandable, but should not become an insurmountable obstacle. We are fully aware of the danger in giving out stories about establishing records, either of speed or of safety, while a job is in progress. Premature statements may well become boomerangs, doing more harm than good to the industry as a whole. But there is a happy medium to be achieved; there are facts and information which can safely be made public, and the contractor must be able to distinguish between what is legitimate publicity and what information should be withheld until the proper time for its release.

The next step is the use of established agencies for the dissemination of publicity. The Highway Information Service mentioned above is one which is ready and eager to help, as far as highway contractors are concerned. The Associated General Contractors of America, through its local branches, is equally well established and desirous of carrying on the campaign. Other local contractor groups are logical units through which such publicity can be secured.

But in the last analysis, none of these agencies can function without the support and cooperation of individual contractors. They must awaken to the necessity of making the public "contract-conscious" and aware of contractors' contribution to the public good, of selling to the public the fact that "built by contract" means built better, more quickly and more economically. For "If you wish in the world to advance, your merits you're bound to enhance; you must stir it and stump it and blow your own trumpet, or trust me you haven't a chance."

New Catalog on Digging And Clamshell Buckets

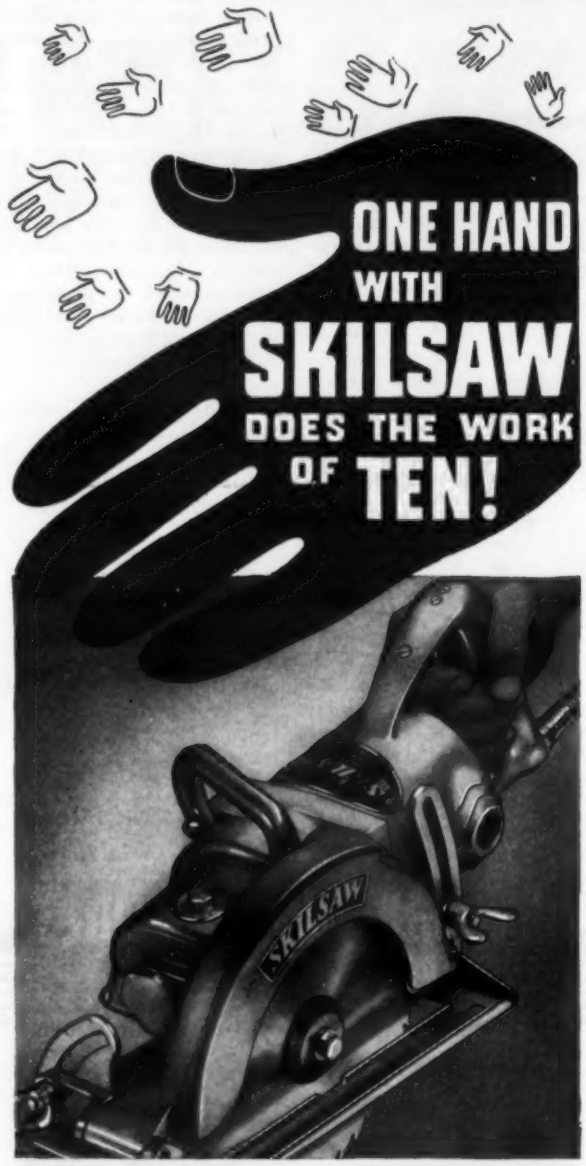
The secret of the power in Kiesler buckets is the double-lever-arm closing action which operates on the same principle as a pair of scissors, the harder the pull the tighter the grip at the cutting edge, according to the manufacturer. For this reason Kiesler buckets dig into the material and never let go until the closing line is released. They are constructed to withstand hard service and are adapted for crushed stone, clay, sand, and other materials. The patented reeving of the cable is simple and is guarded so that the cable can not jump off under any condition.

A catalog issued by Jos. F. Kiesler Co., 936 W. Huron St., Chicago, Ill., contains complete information on its line of clamshell buckets. Those interested may obtain copies direct from the manufacturer.

New Buckeye Dealers

The following companies have been appointed by the Buckeye Traction Ditcher Co., Findlay, Ohio, to handle Buckeye Unitilt bulldozers and trail-builders, rigid-type bulldozers and power control units for Allis-Chalmers tractors in their respective territories: Southern Ohio Equipment Co., Zanesville, Ohio, and Lakeshore Machinery & Supply Co., Muskegon, Michigan.

Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 25 Years
ECONOMICAL and EFFICIENT
Asphalt Joint • Rubber Joint
Non-Extruding Expansion Joint
Plate-Dowel Expansion Joint
Sub-grade Felt
THE PHILIP CAREY COMPANY
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO



MEET today's shortage of manpower with SKILSAW'S *extra* sawing speed that frees men sooner for other work. SKILSAW rips TEN planks while a handsaw rips one . . . SKILSAW cuts every sawing cost, helps you get more jobs at a decent profit!

SKILSAW quickly pays for itself from its savings on wood sawing alone . . . but SKILSAW also cuts stone, metal, tile and compositions. 9 POWERFUL MODELS . . . each one light, fast, easy to handle. Ask your distributor for a demonstration today.

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• Continental Warehouses are located at fourteen strategic points. Hose of all kinds and a complete line of mechanical rubber products are stocked within local phone call in 95% of industrial U. S. A.

CONTINENTAL RUBBER WORKS
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HOSE • • BELTING • • PACKING
MOLDED AND EXTRUDED RUBBER PRODUCTS

C. & E. M. Photo
Spreading and rolling the plant mix while traffic was maintained.

Hot-Mix Resurfacing For Virginia Highway

(*Continued from page* 1)

	Binder	Top
⅝-inch stone	47 per cent	0
⅜-inch stone	34 " "	48 per cent
¼-inch stone	9 " "	35 " "
10-mesh screenings	6 " "	10.75 " "
Asphalt	4 " "	6.25 " "
	100 per cent	100 per cent

Spreading the Mix

On the 9-mile average haul, F. H. Reese of Ironto, Va., contractor on the hauling, used eleven trucks, keeping the Adnun paver busy most of the time. The black-top paver spread the material in two 9-foot strips for the narrower section and in two 10-foot strips for the wider section. On curves where the road was widened still further the Adnun black-top paver ran wide, leaving a space in the middle of the road which was filled by the rakers. Following the usual method but with a slight variation in this case because much of the work was in the mountains, the trucks backed up to the paver, started dumping loads, threw out the clutch and then when operating down hill kept the footbrake on so that the truck would be pushed by the spreader and would not run away from it.

A Department of Highways Inspector at the spreader picked up the batch tickets, there was a full time operator, with a helper, for the spreader and then the Road Foreman watched the longitudinal joint between the two sides of the road and kept the screed adjusted at the sides. Two rakers were used to make up the joint and to fill the center section on wide curves as mentioned above.

The breakdown rolling immediately behind the Adnun black-top paver was done with a Buffalo-Springfield 8-ton roller with the steel rolls thoroughly wet by fiber pads. The final rolling was done with an 8-ton Buffalo-Springfield tandem which also rolled longitudinally except when necessary to take out bumps which were checked with a 12-foot straight-edge, and at construction joints where 45-degree rolling was always done. Flagmen were used at either end of the section where the material was being spread and rolled and one-way traffic was alternated with the last car in each line carrying a red flag.

With the organization described, the contractor regularly laid from 1 to 1¼ miles of binder full width in a 12-hour day, or 1½ miles of top. The average production of the plant as used on the road was 400 tons per 12-hour day with the best run being 515 tons in a 14-hour day. Traffic was permitted to use the road at all times.

In addition to very careful control of the black-top paver as it spread the material, leaving a reasonably accurate edge, the contractor had one man working along the edge at all times, trimming it with a mattock to a smooth neat edge for the top and base. This small amount of material was wasted on the shoulders but the additional work greatly added to the appearance of the job. Except on mountain work where the roads have a considerable amount of curves, this operation is unnecessary, the paver leaving the edge of the road in good condition.

Sealing

The contractor was finished with the work when the surface was laid, rolled and trimmed. Following this, state maintenance forces covered the surface with No. 14 crushed dolomite seal stone, using a spinner spreader attached to the back of a dump truck. The material was spread at the rate of about 5 pounds per square yard and was not rolled except by traffic which did a very good job incorporating it in the surface voids.

Personnel

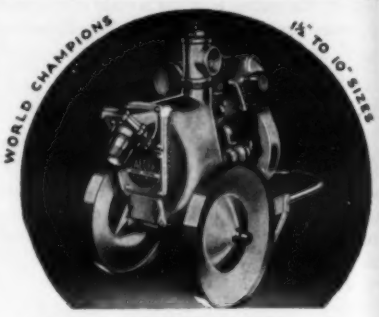
This resurfacing contract was awarded to Sam Finley, Inc., of Atlanta, Ga., and Roanoke, Va., by the Maintenance Division of the Virginia Department of Highways, under the direction of J. J. Forrer, Maintenance Engineer. The work was in direct charge of L. A. Jackson, Principal Engineering Aid as Road Inspector, with C. W. Guerrant and Allen J. Davis as Plant Inspectors. For the contractors, Frank Johnston was Road Superintendent, and R. S. Cloud was Plant Superintendent.

Highway Research Board Annual Meeting Proceedings

The papers and reports presented at the Twentieth Annual Meeting of the Highway Research Board, held in Washington, D. C., last December, have now been published in the Board's annual volume of *Proceedings*.

The subjects covered in this volume include finance, economics, design, materials and construction, maintenance, traffic and safety, and soils investigations. In addition there is information on the Highway Research Board organization, representatives of member organizations, departments and committees, minutes of the business meeting, and memorials.

Copies of this volume of 883 pages, cloth bound, is available at $3.25. The reports on roadside development, issued as a separate volume of 69 pages, are also available at 50 cents a copy. Either or both of these books may be secured direct from the Highway Research Board, 2101 Constitution Ave., Washington, D. C.



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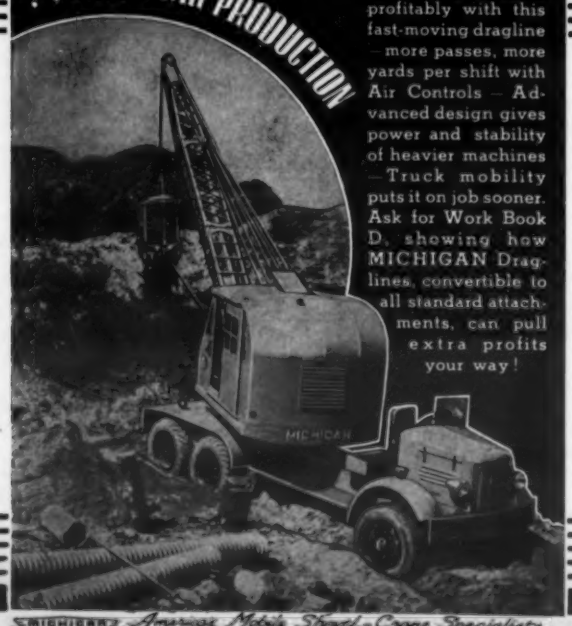

Extra work handled profitably with this fast-moving dragline — more passes, more yards per shift with Air Controls — Advanced design gives power and stability of heavier machines — Truck mobility puts it on job sooner. Ask for Work Book D, showing how MICHIGAN Draglines, convertible to all standard attachments, can pull extra profits your way!

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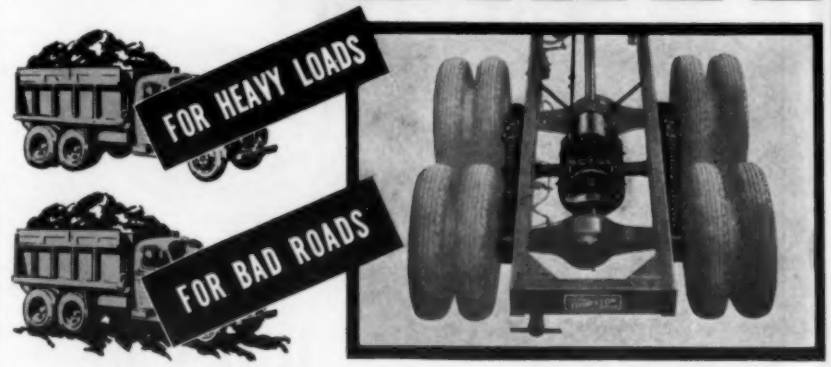
THORNTON 4-REAR-WHEEL DRIVE



In these days when *transportation* must sustain the heavy demands of defense and industrial programs, THORNTON Four-Rear-Wheel DRIVE is rendering a tremendous service in scores of industries. With its application to trucks up to 3-ton rating, it supplies double the tractive effort and more than twice the payload capacity.

This unit is giving vital aid in solving defense transportation problems.

Engineered particularly to meet YOUR requirements, your THORNTON-equipped trucks will carry their bigger loads faster, more economically and, if necessary, through tougher going. "Walking-Beam" dual suspension reduces shock on load and road.

Write today for details concerning application of this unit to your hauling problems.

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Manufacturers also of the THORNTON automatic-locking DIFFERENTIAL
"When you need TRACTION you need THORNTON"

Wyoming Grading Job Improves Tourist Road

(*Continued from page 22*)

graders on the job.

Borrow for Subgrade

Augmenting the unclassified excavation was 40,000 cubic yards of selected gravel for subgrade stabilization, removed from two principal borrow pits located within 500 feet of the road so that the average haul was not more than a mile. The P & H shovel worked in these pits, loading to four Ford V-8 and two GMC 3-yard dump trucks.

Specifications required that the selected gravel should not exceed 3 inches in size. No screening plant was used in the pits, and the oversize, which ran about 5 per cent, was removed from the grade by hand.

Drainage

In addition to the difficulty of compacting fill because of the excessive moisture at that high altitude, there was also the problem of adequate subgrade drainage. To insure proper drainage, 6,300 feet of 6-inch perforated underdrains were laid longitudinally in ditch-section trenches along the shoulders. The P & H was converted to a dragline and excavated pipe trenches from 3 to 4 feet deep. The soil was unstable and threatened to cave in, not only hampering the pipe laying but also wasting backfill material. Therefore the contractor used removable steel forms to hold the ground as the underdrains were laid, pulling the sheets for re-use by means of a tractor winch. The trenches were backfilled with pervious material which had been selected and graded, and the sections and backslopes compacted by four Ingersoll-Rand air tampers supplied with air by an I-R 160 compressor.

In addition to the underdrains, the contractor installed about 3,000 feet of corrugated metal pipe running from 24 to 48 inches in diameter and constructed two monolithic concrete culverts. The 150 cubic yards of concrete for these structures was prepared in a 10-S Koehring mixer and vibrated with a small vibrator.

Care of Equipment

Sand, gravel and boulders are rough on even the sturdiest equipment, and a repair shop completely equipped for an isolated job was maintained. All of the equipment had been carefully checked before reaching Togwotee Pass, and there were no major field repairs necessary at the job site. Most of the shop work was confined to minor replacement, and cutting and welding operations. One item caused particular difficulty, and that was the frequency of cable replacements necessary, which amounted to three times normal.

All equipment was checked and serviced before each shift by experienced mechanics and greasers to prevent costly break-downs while the machines were in operation. All gasoline, diesel oil and lubricants were delivered to the job by truck weekly.

Traffic would hardly seem to develop into a problem on so isolated a grading job as this one, but during the six weeks of mid-summer, tourist travel to Yellowstone Park over U. S. 287 was heavy. As it was impossible to detour this traffic, the cars were routed over the new grade. One of the many services rendered by the contractors' mechanics was that of fixing up a broken crankcase or rear axle "just to keep Eastern dudes happy", as the contractor described it.

Camp and Labor

The camp established on the job comprised an office, warehouse, shop, oil house, three bunkhouses and a cook's shack. Most of the men, however, lived and had their meals in their own trailers which rapidly are replacing bunkhouses on construction projects. The cook house was run at a loss, with the twelve to fifteen boarders scarcely paying the cook's wages.

The job was run in two 7-hour shifts, with a normal double shift as follows:

Supervisory, administrative	4
Skilled labor	18
Intermediate labor	13
Unskilled labor	14

Under the supervisory and administrative classification were the office workers and the contractors' superintendents. Skilled labor included mechanics, greasers and equipment operators, with the exception of the truck drivers. Intermediate labor included the truck drivers and their helpers, tampers and oilers, and the unskilled classification included slopers, muckers, and other hand labor.

Personnel

The work on this project was under the supervision of R. W. and Neil G. Barnard, sons of M. W. Barnard, President of the Barnard Curtiss Co. Bill Burns of Billings, Mont., was Foreman for the contractor and H. E. Dalton was Project Engineer for the Public Roads Administration.

During the past 17 years, the Barnard Curtiss Co. has handled some very tough road jobs in many sections of the country. Their operations have extended from Ohio to Washington and Oregon and from the Canadian border south through Utah and Nebraska. The home office of the firm is in Minneapolis, with M. W. Barnard, President, in charge. G. C. Curtiss, the firm's Vice President, is located at Yakima, Wash.

Last autumn, just before this 4.6-mile job was completed, the Barnard Curtiss Co. was awarded another contract by the Public Roads Administration for a 5-mile stretch adjoining the section described in this article and work is now under way on that project.

The annual convention of the American Institute of Steel Construction will be held at White Sulphur Springs, W. Va., October 14-17.

5 SEAMAN PULVI-MIXERS SET NEW RECORD!!

Five SEAMAN MHD-72 PULVI MIXERS were rushed to Windsor Locks, Conn., to help in the building of soil-cement runways at the new Army airport.

Full credit is given the work of the SEAMAN PULVI-MIXERS in making possible the unheard-of processing rate of 1,000 yards every hour.

Obviously the investment in SEAMAN equipment was but a small item in consideration of the job that was done.

Upper right—The SEAMAN PULVI-MIXERS start the job. Three SEAMAN units are followed by the water distributor and two more SEAMAN MHDs.

Above—After sheepfooting, pneumatic rolling is begun,—followed by a smooth steel roller. All dry and wet mixing was handled by SEAMAN PULVI-MIXERS.

Below—A SEAMAN PULVI-MIXER doing a wet mix. Note the fine level of surface after the PULVI-MIXER.

The Windsor Locks experience is typical of the great savings made possible with the SEAMAN PULVI-MIXER in all in-place mixing.

INVESTIGATE — WRITE TO

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SpeedWay

1/2" DRILL $27.50

This full capacity, industrial ½" Drill is handier, more powerful and an all-around better drill than many costing a third more. Specially wound high torque forced-air-cooled motor. Improved "natural grip" end and breastplate handle applies thrust directly behind drill point—and all quality features: oilless bearings, streamlined die cast case, etc., etc.

SPEEDWAY MFG. CO., 1949 S. 52nd Ave., Cicero, Ill.

A patrol grader mulching top soil by scarifying 6 to 8 inches deep on the A.A. Ballew roadside-development project on U.S. 72 in Alabama.

Care in Sprigging Yields Good Grass

Specifications Exceeded By A. A. Ballew Co. to Produce Excellent Job On U.S. 72 in Alabama

✦ ON a roadside-development contract on U. S. 72 in Alabama, extending from 4 miles beyond Florence along the Lee Highway to Killen, the contractor, the A. A. Ballew Construction Co. of Sheffield, Ala., used particular care in the preparation of the soil for seeding and in the sprigging.

After the preliminary grading, a scraper and patrol grader went over the job again, for the final shaping of all slopes. During this operation Mr. Ballew constructed a special blade for the grader to cut the rounded backslopes at the intersection of the back ditch and the beginning of the backslope, as the specifications required that all slopes 3 to 1 or under be rounded at the top and bottom.

After shaping and dressing, the soil on both the fills and cut banks was scarified to a depth of 8 inches, exceeding by 6 inches the state specifications of 2 inches. Top soil 2 inches thick was then placed over the mulched surface. In spreading the top soil, a scraper was used to good advantage by measuring the pan, determining the number of cubic yards hauled when the pan was level full and then figuring the distance one pan load would go, spreading the soil 10 feet wide and 2 inches thick. A stake was driven at one end of the spread distance and if the operator arrived there with some top soil still in the scraper pan, he closed the gate and turned around, running over the same spread, and distributed the balance of the soil where required.

After the top soil was placed, it was scarified in by the patrol grader, and then mixed by a light disk harrow pulled by a farm tractor. This left the soil in perfect condition for the sprigging operation.

Sprigging

Alabama state specifications require that grass roots shall not come in contact with fertilizer, so one man ran an old-fashioned guano knocker or plow capable of distributing 6-8-4 fertilizer in even quantities and covered it lightly with soil. This plow worked in sections about 300 feet in length, plowing one 300-foot furrow and distributing the proper amount of fertilizer and then returning with another furrow to the starting point, where the fertilizer supply was replenished. About 600 pounds of fertilizer to the acre was used.

Immediately behind the plow came six men with sacks of grass cubes approximately 2 x 2 inches, cut by four to six men from sod blocks 12 x 12 inches x 3 inches thick. Although the specifications called for clusters or tufts of grass at least 1 inch in diameter, Mr. Ballew felt that since the biggest cost of sprigging is in the labor required to place the grass in the furrows, it was much better to use large healthy chunks of grass, so that a good stand of grass would be assured, eliminating the necessity of re-sprigging bare places. Four crews of fifteen men each were employed for the sprigging.

The cutting, loading and placing of the solid sod on this project was done with the same care and interest in turning out an excellent job.

Personnel

Because of his unusual cooperation and excellent work on this roadside-development project on U. S. 72 in Alabama, the contractor was nominated for one of the 1940 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards. The contract, awarded to the A. A. Ballew Construction Co., Sheffield, Ala., for $55,000, was begun in November, 1939, and completed on July 1, 1940.

The project was under the supervision of Oakley McFerrin, Landscape Engineer for the Alabama State Highway Department, with L. A. Burleson, Resident Engineer for the State on the job.

Two-weeks-old solid sod on the Ballew project, showing also the rounded top and bottom of the backslope.

1941 Catalog on Vibrators, Electric Drills and Saws

There is a Mall concrete vibrator for each specific concrete placing problem, whether your job is a bridge, culvert, or concrete pavement. High-frequency or low-frequency vibrators with gasoline-engine, air or electric power units, with different lengths of flexible shafting and various diameters of vibrating elements, can be furnished to meet individual concrete-placing specifications.

These vibrators and other contractors' equipment in the Mall line, including concrete surfacers, portable electric drills, portable gasoline-engine, pneumatic and electric chain and circular saws, are described in literature recently issued by the manufacturer. Copies may be obtained by writing direct to the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill.

Power Assembly Tools

The line of Black & Decker power assembly tools, including portable electric screw drivers, nut runners, tappers, drivers and accessories is described and illustrated in a new 56-page data book recently issued by the Black & Decker Mfg. Co., Towson, Md.

Copies of this data book may be secured by those interested direct from the manufacturer.

Be sure it's the

GIANTGRIPT STRAIGHTEDGE

Either Steel or Aluminum

For Checking Concrete Surface

Two useable edges:—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.

ASK YOUR DEALER

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WHERE THE GOING IS TOUGH
IT STILL TAKES A LINN

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Morris, N. Y.

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CONTOUR-FOLLOWING TRACTION
HAFTRAK

You get capacity payloads IN HARD-PACKED SOIL WITH HEIL TWIN-CABLE SCOOPS!

Down Pressure on Cutting Blade Insures Better Soil Penetration.

Heil Cable Controlled Scrapers are designed and built to give you fast digging of capacity loads, without scarifying, in hard compact soils. The Draft Pivot Point is located above and back of the cutting blade as shown on the accompanying illustration. Pull at the draft hitch forces the blade down into ground, often raising the rear wheels off the ground and placing the weight of the scraper on the cutting bit. The plow-like cutting blade digs into the ground quickly and rolls big loads into the bowl with ease.

Benefit by the EXTRA digging advantages of Heil Cable Scrapers. Experienced contractors from Maine to California are using Heil Road Machinery to make the TOUGH jobs PROFITABLE ones. Equip yourself for profits with Heil Dig-N-Carry Scoops, Bulldozers, Trail-builders and Hydraulic Dump Units . . . Send today for FREE catalog.

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MILWAUKEE, WISCONSIN • HILLSIDE, NEW JERSEY

Heil Trailbuilder and Model DDH Cletrac operating near Denver, Colorado.

Six-Yard Heil Twin Cable Scoop and Model DDH Cletrac on a Railroad Construction Job near Anoka, Minn.

Eight-Yard Heil Dump Body and Heil Telescopic Hoist for dependable service.

The new 3½-S Skipper.

Non-Tilting Mixer With New Features

The Skipper, the new non-tilting 3½-S concrete mixer just announced by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., has a number of new exclusive features, including a 6-inch lower shoveling height which is claimed to cut as much as 5 miles of shoveling in five days of work; a self-cleaning hopper with no hopper gate to jam; a hopper control to make material flow freely into the drum; die-formed pressed-steel drum heads with die-formed pressed-steel polished drum tracks; and a Rex chain belt drive.

This 3½-S is an end-discharge mixer mounted on two pneumatic-tired wheels and is equipped with a 3 1/3-hp air-cooled motor. It is available with or without a water tank.

Further information on the new Skipper mixer may be secured by interested contractors and state, county and town highway departments direct from the manufacturer.

Lessons in Welding

The recently revised and re-edited *Lessons in Arc Welding*, published by the Lincoln Electric Co., makes available to industry, to engineering schools and to trade and vocational schools the accumulated welding instruction information from the Lincoln Welding School which has been in continuous operation for 24 years. Containing 176 pages and 170 illustrations, this book is a series of sixty lessons which present, in concise manner, fundamental facts of welding which will enable the welder to utilize the process successfully and economically. Text explanations are graphically supplemented by line drawings and photos.

A feature of the book is the set of questions and answers for each lesson, enabling the student to check his knowledge. Since the questions are headed by the lesson number and subject matter, they can be of assistance in furnishing the solution to problems.

Copies of *Lessons in Arc Welding* may be secured direct from the Lincoln Electric Co., Cleveland, Ohio, or from this magazine. Price: 50 cents per copy, postpaid, in the United States.

Roadside Development Award Judges for 1941

(*Photos on page 4*)

We take pleasure in announcing the judges for the 1941 Roadside Development Awards to be made by CONTRACTORS AND ENGINEERS MONTHLY to highway contractors or their superintendents for outstanding contributions to roadside development on their highway contracts during the current construction season.

The three distinguished figures who have served as National Judges for the past two years have accepted the post for a third term. They are H. H. Bennett, Chief, Soil Conservation Service, Department of Agriculture; Roy W. Crum, Director, Highway Research Board, National Research Council; and Charles M. Upham, Engineer-Director, American Road Builders' Association, and will select from the four Section Award winners the contractor who has made the most outstanding contribution to roadside development in the entire country.

The Board of Judges for the four Section Awards, made to a highway contractor in each of the four sections of the country, will consist of W. Vance Baise, North Carolina State Highway Engineer, assisted by F. H. Brant, Landscape Engineer for the North Carolina Highway and Public Works Commission; R. H. Baldock, Chief Engineer of the Oregon State Highway Commission, assisted by George H. Otten, Landscape Engineer; L. D. Barrows, Chief Engineer of the Maine State Highway Commission, with Kenneth T. Brown, Landscape Engineer for the Commission assisting; and Earl B. Lockridge, Chief Engineer of the Indiana State Highway Department, assisted by H. J. Schnitzius, Landscape Supervisor, each pair judging nominations from a section other than their own.

Goodrich Personnel Changes

Clyde DeLong has been named Operating Manager of the Mechanical Sales Division of the B. F. Goodrich Co., Akron, Ohio, succeeding F. A. Lang, according to an announcement made by this company. Mr. DeLong has served in various capacities since joining B. F. Goodrich in January, 1928, as a clerk in the Mechanical Division factory offices.

Other changes have been made in the company's sales personnel as follows: O. C. Mueller has been transferred as sales representative from Cincinnati to Pittsburgh, and is succeeded at Cincinnati by A. C. Lutz; J. M. Cooney is transferred from Cincinnati to Dayton; B. E. Silver, formerly with the Manufacturers' Sales Department in Washington joins the Hose Sales Department at the principal company headquarters in Akron, Ohio; and J. V. Powers, sales correspondent in the New York District Office, becomes field representative of the district with headquarters at Albany.

SNOW PLOWS FOR ANY MOTOR TRUCK . . . IN "V", REVERSIBLE AND ONE WAY TRIPPING BLADE TYPES . . . SNOW PLOWS FOR LIGHT AND HEAVY TRACTORS . . . FOR HIGHWAY, STREET OR SIDEWALK SNOW REMOVAL.

Today, when speed is vital, there is more urgent need than ever before to make early and adequate provision for snow removal. Have you a sufficient force of good reliable snow plows ready to fight when the heavy snows come?

For 33 years Baker Snow Plows have been renowned for dependability of performance on the streets of America's largest cities, on leading state highways, in numerous Federal departments and in the nation's largest industries.

Only Bakers give you such features as sectional tripping blades, scientific moldboard curvature and compact, efficient hydraulic control. Satisfied owners are Bakers biggest boosters. Find out why.

Ask for Snow Plow Bulletins

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BAKER SNOW PLOWS

USE RIGHT BUCKET FOR THE JOB

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Sorry—

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photographs are "out" for the duration.

We'd like you to see the plant that will turn out concrete faster than it has ever been poured before on dry dock construction. We'd like to show you the Butler plants working on every phase of the national defense program—air bases, ordnance depots, cantonments, factories, TNT plants, naval supply depots.

And we'd like you to know that on every drydock project east of the Rocky Mountains, Butler plants furnish the concrete at unprecedented speeds. At Charleston, Portsmouth, Philadelphia, Bayonne, Brooklyn, and Boston, the Navy has turned to Butler equipment.

Whether you need a central mixing plant for a monster dam, or whether you are interested in a small bulk cement plant, consult Butler engineers. It pays to have the best.

Write to—

BUTLER BIN CO.

WAUKESHA, WISCONSIN

South American Section Of Pan American Route

(*Continued from page 17*)

the proposed Pan American Highway system, which eventually will connect all of the South American capitals, include the Simon Bolivar Highway, extending from La Guaira, Venezuela, on the Atlantic Coast, to Guayaquil, Ecuador, on the Pacific Coast, a distance of 2,295 miles. This route has 2,018 miles of all-weather surface and 277 miles of dry-weather surface. The Rio de Janeiro-Montevideo - Buenos Aires Highway, 1,922 miles in length, has 1,021 miles of all-weather surface, 870 miles of dry-weather surface, and the remaining 31 miles of the route is the distance across the Plata River from Buenos Aires to Colonia, Uruguay.

The general progress being made on the system as a whole is indicated by the fact that it is now possible to drive from Lima, Peru, to Buenos Aires in the dry season, and in any season to drive from Caracas, Venezuela, to a point south of Quito, Ecuador, a distance of nearly 2,200 miles.

Panama-Colombia Section

Forty miles south of Panama City, the southern terminus of the Inter-American Highway, the improved road ends in almost impenetrable jungle, and no further progress has been made in the construction of the essential connection between the Canal Zone and the Panama-Colombian border. This section, about 300 miles long, lies in large part in the Darien Indian region of Panama and is the least explored area along the entire route. It is reported that only one white man has ever made a continuous journey through this country, which extends for about 50 miles beyond the border into Colombia. At present these 300 miles are under study, but not even reconnaissance surveys for such a highway have been made.

From Dabeiba in northwestern Colombia to Medellin and Murillo, where the Simon Bolivar Highway joins the west coast route of the Pan American Highway, on to the Colombia-Ecuador border, there is 742 miles of all-weather surface, 68 miles of dry-weather surface, and about 100 miles of trails.

Ecuador's Highway

Ecuador's share of the Pan American Highway is 721 miles long, which includes 193 miles of paved road, 262 miles of all-weather surface and 266 miles of dry-weather road. However, part of the section from San Juan south to the Ecuador-Peru border is now being improved, this work being financed by a $900,000 loan by the Export-Import Bank of Washington.

Comparatively little asphalt or cement has been used in road construction in this country, and a large part of the road work is done by hand labor. During recent years, however, there has been an increase in the use of road machinery, such as tractors, scrapers and graders, all of which has been imported from the United States. It is anticipated that the Export-Import Bank loan will greatly increase the road-machinery imports to speed up work on that section of the Pan American Highway.

Peru and Bolivia Sections

Of the 1,666 miles of Pan American Highway in Peru, 783 miles is paved and the remaining 883 miles has an all-weather surface. Prior to 1937 this country had been very backward in the development of a national highway but from 1937 to the end of 1939, Peru carried on its most extensive and progressive road program, involving the construction of about 1,696 miles of new highways, the improvement of 292 miles of roads, and the reconstruction of 161 miles. Gradual improvement is being made on the Peruvian section of the Pan American Highway, about 1,568 miles of which has been surface-treated. In a few years of intensive construction, Peru has advanced its motor transport facilities far beyond the levels of most of the Latin American countries.

At Vitor, in southern Peru, the Pan American Highway branches, offering a route south through Chile or an alternate route through La Paz, Bolivia, to Argentina. The Peruvian section of this route, as well as the entire 700-mile section through Bolivia, is a dry-weather route only. Road construction has been very slow in Bolivia, due to the limited funds made available each year for the construction and maintenance of national highways. Only 20 per cent of all the roads in Bolivia are of improved earth and gravel, there are no sections of roads anywhere in the country surfaced with asphalt, macadam, or any other of the higher types of surfacing, and the only concrete, asphalt or block-stone construction is found in La Paz and some of the larger cities. It is reported that unless outside funds are obtained, it is not likely that the construction of national roads in Bolivia will increase materially in the near future.

Chile Has Good Roads

Chile was one of the first countries to inaugurate a highway construction program, and considerable progress has been made since the late 1920's. Because of the long narrow geographical outline of Chile, its most important highway is the longitudinal route comprising its section of the Pan American Highway, from which short roads provide access to the various small ports on the Chilean coast between Peru and Valparaiso.

Much of the Chilean section of the Pan American Highway is through the desert area in the northern part of the country where it has not been found necessary to improve greatly the ancient trails which are still used for the transportation of the mineral products available in the north. However, of the 1,597 miles of Pan American Highway through Chile, 145 miles are paved and the remaining 1,452 miles is a fair all-weather road.

Routes in Argentina

Argentina has four sections of the Pan American Highway within her borders: the east-west route from the Chilean-Argentinian border extending east through Mendoza and San Luis to Buenos Aires, a distance of 798 miles; and an alternate route of 1,322 miles coming from Bolivia through Cordoba and Rosario to Buenos Aires. In addition there are the road connecting Buenos Aires and Puerto Pilcomayo and the Santa Fe-Parana-Paso de los Libres road leading directly to Brazil and skirting around Uruguay. Of the route from Chile, 311 miles has been paved, 240 miles has all-weather surface, 206 miles dry-weather surface, while 41 miles are only trails. On the section from Bolivia, 583 miles is

(*Concluded on next page*)

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"For use where power is not practical or available"
Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, ½" cable used:

2-Ton "Lightweight"	75 ft.
5-Ton "General Utility"	250 ft.
15-Ton Triple-Geared "Special"	1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price, f.o.b. Seattle
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

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IT RUBS AND GRINDS
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IT DRILLS AND DOES MANY OTHER JOBS

• *OPERATES ALL DAY ON 1½ to 2 gallons of GASOLINE* •

● This MALL 9-Job Portable Power Unit is helping contractors to cut costs in every direction on closely figured jobs—to increase profits and to avoid penalties by getting jobs finished on schedule. It can be operated anywhere—will run all day on 1½ to 2 gallons of gasoline—is easy to start and runs by itself. In addition, it furnishes driving power for Concrete Vibrating, Concrete Surfacing, Form Sanding, Sawing with Circular or Chain Saw, Grinding, Drilling, Wire Brushing, Pumping and Sharpening Tools or Bits! The swivel-fitted, interchangeable attachment feature makes it possible to change tools in a jiffy. A Free Demonstration enables you to try before you buy.

Write today for full details and 1941 Catalog of Contractors' Equipment.

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It Tamed a Raging River

Engineers worked fast when rising waters broke through levees to flood 35,000 acres of rich farm land in the Sacramento River valley. Using ARMCO sheeting they repaired the breaks, brought order out of chaos, and at the same time laid the groundwork to prevent a repetition of the disaster.

A closure structure was erected, using a timber and pile bulkhead faced with sturdy ARMCO Corrugated Sheeting. This afforded immediate relief and served as the core wall for a new permanent levee.

Emergencies like this one are unusual, yet there are many regular jobs that you can do exceedingly well with ARMCO Sheeting. Use it for trenches, cofferdams, foundations and similar projects. You'll find it low in cost, amply strong yet light in weight and easy to handle. It drives fast and can be used again and again.

ARMCO Corrugated Sheeting is available in three designs to meet various job requirements. Write for more information regarding its many practical advantages. ARMCO DRAINAGE PRODUCTS ASSOCIATION, 5058 Curtis Street, Middletown, Ohio.

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Progress on Highway To Connect Americas

(Continued from preceding page)

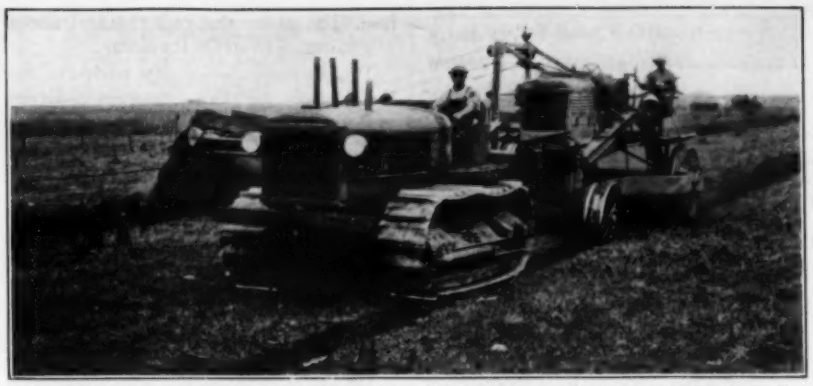
paved, mainly the section from Buenos Aires to Rosario and Cordoba, 568 miles is all-weather surface, 88 miles dry-weather surface, and 83 miles of trails, this in the northern section toward the Bolivian border.

The highway program in Argentina is probably the most aggressive of any of the Latin American countries, a provision for setting aside gasoline and related taxes to finance the program's expenditures having placed the National Highway Bureau on a sound basis for present and future developments. The sections of the Pan American Highway are included in the program to be completely paved along with all of the other main roads and have not been made special projects, and it is not possible to predict at this time the date for the completion of these routes, although a total of 894 miles has already been paved.

The Argentine program is based primarily on low-cost construction and therefore its equipment requirements consist largely of graders, tractors and trucks. In the past few years there has been a tendency to increase the amount of hand labor used in road construction to provide work for the unemployed.

Buenos Aires-Rio de Janeiro Route

The section of the Pan American Highway extending north from Buenos Aires to Rio de Janeiro begins by the crossing of the Rio de la Plata, a trip of 31 miles by fast steamer ferry, where a paved road extends from Colonia to Montevideo, capital of Uruguay, and beyond. The Uruguayan section consists of 391 miles, of which 311 is paved, 55 miles is an all-weather route, and 25 miles is a dry-weather route only. For several years preceding the depression of 1929-33, a large amount of road construction was done in Uruguay, and during the period of the depression, the construction of the 100-mile concrete road between Montevideo and Colonia was started, in order to provide rapid transportation to Buenos Aires. This road, which is a part of the Pan American Highway, was completed in 1934 and cost about $5,000,000.



An Allis-Chalmers tractor and Adams elevating grader starting the construction of a new road in Argentina.

In Brazil, the largest of the South American republics, the Pan American Highway extends from the Uruguay-Brazil border to Rio de Janeiro, a distance of 1,500 miles. Of this, 655 miles is paved, mostly the northern end from Rio de Janeiro through Sao Paulo to Curityba, and the remaining 845 miles is practically an all-weather route. Although during the past three years some road construction has been done by the National Government in the northeastern states in connection with a large drought-relief rehabilitation program and certain road work in the southern part has been performed by the Engineering Corps of the Army, the main programs of highway construction are in the hands of the state highway departments.

Conclusion

A survey of the South American countries indicates that there is room for a very much extended construction of highway routes to care for future economic development of large areas which are at present blocked off from exploration, settlement and exploitation by lack of roads of access. In some cases, the completion of the Pan American Highway would provide access to these regions, while in others it would probably provide the necessary stimulus to construct access roads from these regions to the Pan American route. In addition, joining the capitals of the South American countries to each other and to the United States should provide a still further link in the chain of understanding, good will and mutual benefit, to make for even greater solidarity of the Western Hemisphere.

With European markets cut off at the present time, the countries of South America are turning toward the United States for the machines and materials to carry on their highway programs, and the further development of their highway systems and the new territories which will thereby be opened up will offer still greater opportunities for the exchange of goods.

We are indebted to E. W. James, Chief, Inter-American Regional Office, Public Roads Administration; Major B. P. Root, Highway Specialist, Public Utilities Unit, Division of Industrial Economy, Bureau of Foreign and Domestic Commerce; and Lieut.-Col. E. E. Valentini, Pan American Highway Confederation, for the data on which this article, the last in our series on the Pan American Highway, is based.

New Conveyor System

The Bulk-Flo conveyor, a new conveying system for handling a wide variety of bulk materials such as lime, silica sand, gypsum, cement and similar materials where large quantities of such materials must be kept moving continuously, is described in a new bulletin recently issued by the Link-Belt Co., 307 No. Michigan Ave., Chicago, Ill. Features of the system are its self-feeding, self-cleaning, positive conveying and simple construction.

Copies of this bulletin, No. 1975, may be secured from the manufacturer by mentioning this magazine.

Easy Dumping—Easy Running

The F-4½ Barrow is built for easy loading or dumping, correct width for hoists, deep tray for wet concrete or mortar, never-slip axle 16" wheel with ball bearings.

LANSING F-4½ BARROW

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THE MOST IMPORTANT UNIT On Soil-Cement Construction

ARIENS AGGMIXER

Mixes all materials thoroughly—producing a low cost dust-free city street. Operates with other general purpose road equipment, with power take-off from suitable tractor, as illustrated here.

An illustration of damp mixing with Ariens Aggmixer after water has been applied by pressure distributor.

The swirling chopping action of the Aggmixer tines does a thorough job of mixing—wet or dry. The Aggmixer is easy to operate—safe in its operation. We'll gladly tell you by job facts how its exclusive features do a thorough, rapid and economical job.

ARIENS COMPANY, BRILLION, WISCONSIN

Galion No. 101 motor grader on a road widening job in California. This big grader has full revolving circle to permit any blade adjustment—diesel or gasoline engine — all-gear driven double drive—centralized finger-tip controls and other important features to provide low-cost operation.

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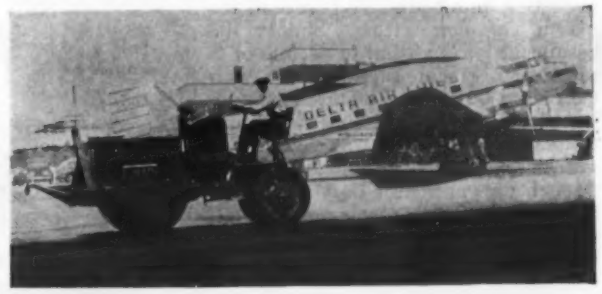
Galion everywhere . . . working on access roads to airports, camps, navy yards and defense plants . . . and on new road construction and maintenance. Motor graders, road rollers, spreaders and pull graders . . . built right to do the job right and at the lowest possible cost to you.



Galion portable roller (right) compacting black-top on runways in airport construction. Weight variable from 7500 to 10,000 lbs.—easily portable by attaching to truck. 4-cylinder gasoline engine.

THE GALION IRON WORKS & MFG. CO. GALION OHIO

Motor graders—three models
Rollers—3-wheel, tandem, portable, trench and sheepsfoot
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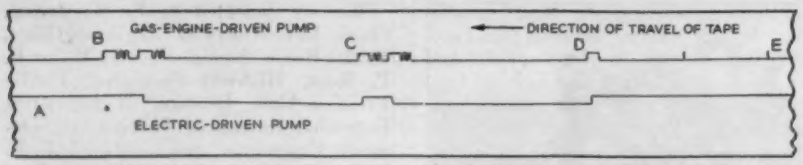
Pull graders—four sizes—manual or hydraulic control



Reproduction of paper ribbon 2¼ inches wide on which is recorded the action of the two pumps installed to handle drainage at an underpass on U. S. 90 in Texas.

Handling Drainage At Texas Underpass

(*Continued from page* 1)

set about licking the power-off problem. Seven storms with the power off each time, causing seven floodings of the underpass, made the excellent electric-pump installation a complete loss.

The Original Installation

When the four-lane highway was carried beneath the single track of the T & N O Railroad on U.S. 90, it was noted that the ground was a heavy water-bearing sand. Thus, it was inevitable that there would be an accumulation of ground water in any sump which might be installed for automatic drainage. The fact that a power line ran alongside the railroad tracks made the selection of electric power the obvious choice, but it was not realized that this line would be dead during many of the storms which would flood the underpass.

The original installation was completed in 1937 and consists of an 8-inch Fairbanks-Morse pump and motor with a capacity of 2,000 gpm and operated by a float control. This is installed in a concrete pump house measuring 12 x 9 feet and located on the bank, well above the highway, to prevent the possibility of the motor being flooded out. No difficulty has been experienced in the operation of this pump in emptying the well periodically when ground water filled it or during storms when there is no power failure.

New Gas-Engine Installation

The repeated power failures led to consideration of the installation of a gas engine unit with the same float control. A 3,000-gpm Chicago Pump Co. unit was installed in the same sump, with an Amarillo Welding & Machine Works right-angle pump drive at the top of the vertical shaft, leading to a 30-hp 4-cylinder Wisconsin air-cooled motor. As operated at the present time, the float causes the electric starter of the gasoline engine to operate but if the engine does not start immediately the starter makes four efforts of 15 seconds each at 5-second intervals, controlled by a unit furnished by the Synchro-Start Products, Inc. of Toledo, Ohio. Usually, these four starting efforts result in the pump operating, but should it fail to start, the cause of the failure is indicated on the Synchro-Start control by a white light which shows an ignition failure or a green light indicating an oil pressure failure as the reason for non-starting. Should the gasoline-driven unit fail to operate or if the water rises more rapidly in the sump than it can be removed by the 3,000-gpm pump, the electric unit cuts in and operates. Some difficulty was experienced with the gas-engine installation at first, through pre-ignition or backfiring. This has been overcome by replacing the single horizontal exhaust with three exhausts, two horizontal exhausts and one vertical.

The gasoline-engine-driven unit discharges through a line of Acipo 10-inch cast iron pipe and the electric-driven unit through a similar 6-inch pipe to a drainage ditch above the roadway.

Gasoline for the engine is stored in a 20-gallon tank located at roadway level where it may be easily filled by a service truck. Should the vacuum pump of the gas engine fail to operate, a Deming hand pump was installed to lift the gas to the half-gallon vacuum tank to reestablish the fuel supply.

The Telltale

Inasmuch as the gas-engine installation was experimental and its hour-to-hour operation somewhat doubtful, the Highway Department designed a clever gadget which would make a permanent record of the starts and stops of both the gas and electric pumps. This recording device starts when either pump starts and is driven by an automobile windshield fan motor through a reducing gear train taken from an obsolete automatic traffic counter. This moves a paper ribbon 2¼ inches wide over a sheet of metal so that two pencils, one for each pump, draw a continuous line when the tape is moving. Each start of a pump is indicated by a short lateral movement of the corresponding pencil, actuated by a small solenoid. The motion of the tape is about ⅞-inch per minute of operation of a pump so that the starting efforts of the gas unit are shown very clearly by a series of peaks in the otherwise uniform line. The gas-engine unit requires about 1½ minutes to drain the sump.

During the experimental period of the installation of this gas-engine-driven unit (and it is believed that the system will be continued), one of the maintenance men visits the pump house once a week and makes a record of the number of times each pump started and the number of times it failed to start, as shown by the record on the tape. Adjustments in the timing of the gas engine have resulted in smoother operation and fewer failures to start which would require the cutting in of the electric unit.

On the accompanying reproduction of a section taken from the tape record of the operation of the two pumps during a period of heavy rain, at A the electric pump is operating. At B the gas-engine-driven unit made four efforts to start, immediately followed by four more, during which the electric pump cut out, and the second series of efforts of the gas-engine starter being successful it continued to operate for well over 2 minutes until the well was drained. Then again, it had a little difficulty in getting started at C so that the electric pump cut in again immediately, but as there was not very much water in the well it shut off quite promptly and on the second series of efforts of the gas-engine it started and carried the load. From D to E the gas-engine unit started promptly; therefore the electric unit did not operate.

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Novo—Pumps
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Rodgers—Hydraulic Presses
Saegen—Derricks & Winches
Soheo—Salamanders
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Symons—Column Clamps
Templeton, Kenly & Co.—Trench Braces, Jacks
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REX Mixers and Pavers
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Brooks Load-Luggers
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Master Concrete Vibrators
Nelson Bucket & Snow Loaders
P & H Shovels, Cranes
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keep this Directory of Dealers in construction equipment up to date. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.

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ROWE—Can't Drift Snow Fence
SWEET'S—Steel Posts
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Blueprint and photostat operators interested in these positions may secure further information and application forms at any first or second-class post office or from the Civil Service Commission, and are urged to send their applications at once to the U. S. Civil Service Commission, Washington, D. C.

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Dobbie Derricks
Four Wheel Drive Trucks
Haiss Loaders, Conveyors, etc.
Hough Road Sweepers, Sprinklers, etc.
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Jahn Machinery, Trailers
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Newport Culvert Pipe
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Member: Associated Equipment Distributors

OSBORNE EQUIPMENT COMPANY
525 State Street, Knoxville, Tennessee
Distributors for
American Cable Div., American Chain & Cable Co.
Ariens Co.
Boston Woven Hose & Rubber Co.
Buckeye Traction Ditcher Co.
J. I. Case Co. (Industrial)
Cleveland Tractor Co.
Davenport Besler Corp.
Galion Iron Works & Mfg. Co.
Gardner-Denver Co.
Hug Co.
Iowa Mfg. Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
C. S. Johnson Co.
Northwest Engr. Co.
Owen Bucket Co.
Pomona Pump Co.
Skilsaw, Inc.
Member: Associated Equipment Distributors.

WILSON-WEESNER-WILKINSON CO.
Nashville Tennessee
Representing
Allis-Chalmers Mfg. Co.
Ames Baldwin Wyoming Co
Baker Mfg. Co.
Blaw-Knox Co.
Cleaver-Brooks Co.
Clyde Iron Works, Inc.
E. D. Etnyre Co., Inc.
Gorman-Rupp Co.
Ingersoll-Rand Co.
Insley Mfg. Co.
Koehring Co.
Littleford Bros.
Master Vibrator Co.
The Parsons Co.
Smith Engineering Works
Gar Wood Indus., Inc.
NASHVILLE—KNOXVILLE
Warehouse Stocks of Service
Reinforcing Steel and Mesh
Member: Associated Equipment Distributors

BROWNING-FERRIS MACHY. CO.
205 Exposition Ave. Dallas, Texas
Texas at Rice Sts. Houston, Texas
Representing
Cleveland Trencher Co.
Foote Company—Pavers
Galion Iron Works & Mfg. Co.
Buoyrus-Erie—Scrapers, Bulldozers
Ingersoll-Rand Company
International—Tractors
Iowa Mfg. Co.—Cedar Rapids Line
Jaeger Machine Company
Jones Superior Mach. Co.
Littleford Brothers
The Owen Bucket Company
Page Engineering Co.
Sterling Wheelbarrow Co.
Thew Shovel Company
Trackson Company
Member: Associated Equipment Distributors

R. B. EVERETT & CO.
3112-18 Harrisburg Blvd. Houston, Texas
BLAW-KNOX Road Plant Equipment, Bins, Clamshell Buckets
AMERICAN Hoisting Machinery
"P. & H." Gasoline Cranes
McKIERNAN-TERRY Pile Hammers, etc.
CONNERY Asphalt Equip.
CHAIN BELT Concrete Mixers, Saw Rigs, Pavers
NOVO Engines, Hoists, Pumps
"RED STAR" Wheelbarrows
SAUERMAN Cableways
BATES Wire Ties
PULSOMETER & NYE Steam Pumps
PATENT Safety Swinging Scaffolding
TRU-LAY Wire Rope
BUFFALO-SPRINGFIELD Road Builders
SULLIVAN Compressors
PORTABLE Conveyors
ETNYRE Asphalt Distrs.
FLYNN Surgrader
PAGE Dragline Buckets
MALL Vibrators
Member: Associated Equipment Distributors

PHILLIPS MACHINERY CO.
900 East Cary St. Richmond, Va.
Representing
Aeroil Burner Co., Inc.
Austin Machinery Corp.
Broderick & Bascom Rope Co.
Butler Bin Company
Chain Belt Company
Clyde Iron Wks., Inc.
Concrete Surfacing Machy. Co.
Independent Pneumatic Tool Co.
Jackson Mfg. Co.
Manitowoc Engineering Works
Master Vibrator Company
Rogers Brothers Corp.
Sasgen Derrick Co.
Sauerman Brothers, Inc.
Skilsaw, Inc.
Stephens-Adamson Mfg. Co.
Vulcan Iron Works
Member: Associated Equipment Distributors

CONSTRUCTION EQUIPMENT CO.
1118-1124 Ide Ave., Spokane, Wash.
Aeroil Burner Co., Inc.
Archer Iron Works
Bates Wire Ties
Beebe Bros.
Blystone Mfg. Co.
Broderick & Bascom Rope
Buoyrus-Erie Co.
Buffalo-Springfld. Roller Co.
Butler Bin Co.
Chain Belt Co.
Climax Eng. Co.
Concrete Surf. Machy. Co.
D-A Lubricant Co.
Detroit Graphite Co.
R. E. Dietz Co.
Duff-Norton Mfg. Co.
Fairbanks, Morse & Co.
Fate-Root-Heath Co.
Homestead Valve Mfg. Co.
Kalamazoo Ry. Supply Co.
LeRoi Co.
The Lindo Air Products Co.
M. & M. Wire Clamp Co.
Mall Tool Co.
Niagara Mfg. Co.
Red Star Products Co.
Sasgen Derrick Co.
Sheldon Mfg. Co.
Sterling Machinery Corp.
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Sunbeam Mfg. Co.
Templeton, Kenly & Co.
Williamette Hyster Co.
"Williams" Buckets, etc.
Young Iron Works
Member: Associated Equipment Distributors

BOEHCK EQUIPMENT CO.
2404 W. Clybourn St. Milwaukee, Wis.
Representing
American Hoist & Derrick Co.
Byers Machine Co.
Centaur Co.
Concrete Surfacing Machy. Co.
Electric Tam. & Equip. Co.
Hauck Mfg. Company
Hercules St. Products Co.
Huber Mfg. Co.
Iowa Manufacturing Co.
Independent Pneumatic Tool Co.
Jaeger Machine Co.
C. S. Johnson Company
Jones-Superior Machine Co.
LeRoi Co.
A. Leschen & Sons Rope Co.
Lima Locomotive Works
McKiernan-Terry Corp.
N. P. Nelson Iron Wks., Inc.
Portable Machinery Company
Red Star Products, Inc.
Rogers Bros. Corp.
Sasgen Derrick Co.
Superior Concrete Accessories, Inc.
Union Fork & Hoe Co.
Union Metal Mfg. Co.
Walker-Turner Co., Inc.
Wellman Engineering Co.
Member: Associated Equipment Distributors

CUNNINGHAM-ORTMAYER CO.
429 W. Michigan St. Milwaukee, Wis.
Blaw-Knox Truck Mixers
Butler Bins, Batchers
C.H.&E. Pumps, Hoists, Saw Rigs
Case Tractors and Mowers
Cleveland Formgrader Paving Equipment
"Dowflake" Calcium Chloride
Eagle Crushers
Flexible Road Joint Machines
Flexible Sewer Cleaning Equipment
Galion Iron Graders, Rollers and Spreaders
Good Roads Snow Plows
Handlan 100-Hour Lantern, Torches
Heltzel Steel Road Forms
Ingersoll-Rand Air Compressors, Tools
Insley Power Shovels, Conc. Towers & Buckets
Koehring Conc. Mixers, Cranes, Shovels, etc.
Kwik-Mix Conc. Mixers
Littleford Distributors, Tar Kettles, Heaters
Multiplex Conc. Block Eq.
Omaha Dragline Buckets
Owen Clamshell Buckets, Grapples
Pasche Spray Painting Equip.
Parsons Trenchers
Reeth Conc. Vibrators
Sterling Wheelbarrows
Tuthill Hwy. Guard Rail
Wenzel Tarpaulins
Wire Rope Corp. of America
Woolridge Scrapers
Member: Associated Equipment Distributors

WE WOULD LIKE TO HAVE YOU HELP US
keep this Directory of Dealers in construction equipment up to date. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.
CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Ave. New York

HUNTER TRACTOR & MACHY. CO.
327 So. 16th St. Milwaukee, Wis.
Exclusive Distributors
Aeroil Burner Co.
American Steel & Wire Co.
Barco Mfg. Co.
Bates Valve Bag Corp.
Beebe Bros.
Blaw-Knox Co.
Buckeye Traction Ditcher Co.
Buffalo-Springfield Roller Co.
Chain Belt Company
Clyde Iron Works, Inc.
Dempster Bros., Inc.
Kelley Electric Mach. Co.
Master Vibrator Co.
Northwest Engrg. Co.
R-B Equipment Co.
Sasgen Derrick Co. (open account)
Sauerman Bros., Inc.
Silent Hoist Winch & Crane Co.
Sullivan Machy. Co.
Syntron Co.
Universal Form Clamp Co.
Vulcan Iron Works
Member: Associated Equipment Distributors

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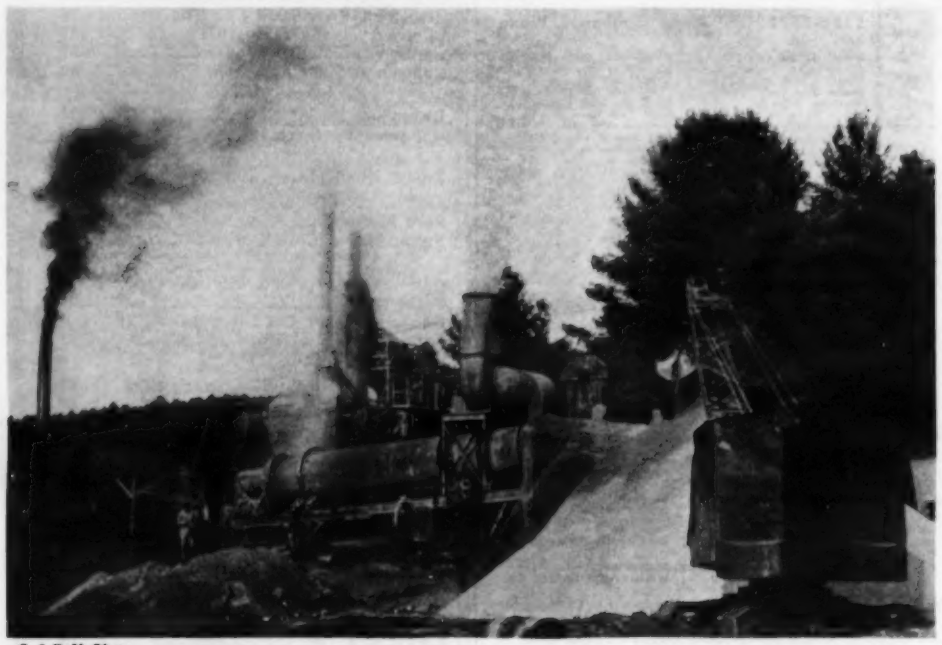
Contractors and Engineers Monthly

C. & E. M. Photos

A gang mold for ten curbs locked ready for pouring in the casting yard where 6 miles of precast curb was prepared for use along the treated gravel roads at Westover Field, the Army Air Base near Chicopee Falls, Mass. See page 2.

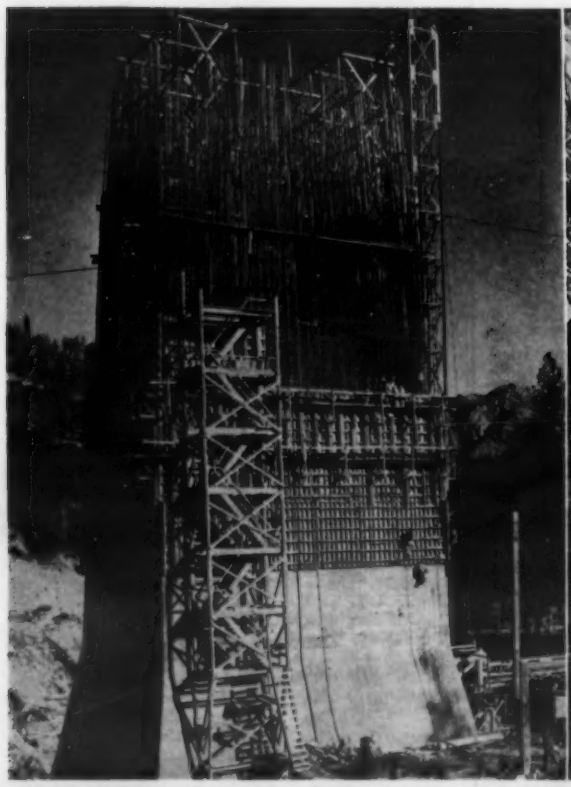
In circle, moving a 24-hour-old curb to the curing side of the yard and inverting it from the pouring position. Above, the cradle is returned to pick up another curb from the gang mold. Nelson Cement Stone Co., sub-contractor, produced 120 curb sections a day.



C. & E. M. Photo

The Finley hot-mix plant at Bastian, Va., required a 9-mile haul for batch trucks. See page 1.

The Nevada Department of Highways' special service car to maintain and repair state equipment in the field. Mechanic Clarence Lyons is in charge. See page 31.



Bureau of Reclamation Photos

Pit River Bridge, part of the highway and railroad relocation project made necessary by the construction of Shasta Dam in California, will be the world's highest double-deck structure. At left, Pier No. 4 is bristling with reinforcing steel, most of it 2 x 2-inch in cross section, making it the heaviest ever used for this purpose. At right, a progress photo showing steel erection of the superstructure. See page 2.

Public Roads Administration Photo

The Pan American Highway, to link the Americas together in greater solidarity through the bond of good roads, involves work in all types of terrain. Here is a typical view in Brazil. See page 17.